MADURAI UNIVERSITY

THE CALENDAR 1974

VOLUME II

(PART II)

REGULATIONS AND SYLLABI

Published by
THE MADURAI UNIVERSITY

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மதுரைத் தமிழ்ச் சங்கம்.

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VOLUME II

Part II

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CHAPTER XLII

DEGREE OF BACHELOR OF ARTS AND BACHELOR OF SCIENCE

(B.A. and B.Sc.)

(THREE YEAR DEGREE EXAMINATIONS)

Regulations

Conditions for Admission

1. Candidates for admission to the Degree of Bachelor of Arts or Bachelor of Science Examination shall be required to have passed the Pre-University examination of this University or an examination accepted by the Syndicate as equivalent thereto and to have subsequently undergone a prescribed course of study in an affiliated college of this University for a period of not less than three academic years or nine terms.

Candidates who have passed the Pre-University examination with specialised course in Tamil under Part III—Group C, will be admitted to the B.A. degree course of Br. XII (b) Specialised Tamil.

Candidates who have passed the Pre-University examination and the Pulavar 2-D Tamil examination shall be eligible for admission to the B.A. degree course in Br. XII (b) Specialised Tamil.

Candidates who have passed the Pre-University examination with specialised study of Sanskrit and Tamil under Part III—Group D will be admitted to the B.A. degree course under Br. XII (c) Specialised course in Sanskrit and Tamil.

2. The course of study shall comprise the following subjects according to syllabus to be prescribed from time to time :—

Course of Study

The course shall be common for the Bachelor of Arts and Bachelor of Science degrees in Parts I and II.

Part I—Tamil or any other selected language

The course shall comprise the study of any one of the following Regional or Classical or Modern (Indian or Foreign) languages at the option of the candidate according to the syllabus and text-books prescribed from time to time :—

Regional language : Tamil

Classical : Sanskrit and Arabic

Modern :

(1) Indian : Telugu, Kannada, Gujarathi, Bengali, Malayalam, Urdu and Hindi

(2) Foreign : French.

In the case of candidate whose mother tongue is not Tamil, a separate syllabus is prescribed for them.

Candidates offering Branch XIII—Indian Culture under Part III of the B.A. degree course shall choose only either Tamil or Sanskrit.

The studies of detailed texts to be prescribed shall extend over a period of two years and the candidates shall

be examined at the end of the first year and the second year in the texts prescribed therefor. There shall be three papers each of three hours duration carrying 100 marks, each.

Part II—English

The course should aim both at the further development of the language skills acquired by students in the Pre-University course and at the introduction of students to English literature through the study of a few of the finest compositions in prose, poetry and drama in English literature.

Those two aims of the study of literature and language can really never be completely separated except in a technical study of language. For, in the last analysis, good literary composition in writing that conveys meaning or significance most effectively. Hence in the B.A./B.Sc. syllabus the two aims are to be held and pursued together, as far as possible in every part of the syllabus.

Syllabus :

The course will comprise the following :

(*a*) Language study (first year)

(*b*) Study of 20th Century prose (first year)

(*c*) Introduction to the classics—poetry, drama, and Pre-twentieth century prose (both years)

(*d*) Extensive reading (both years)

Part III—Optional Subjects

The optional subjects shall consist of two Groups—Group A and Group B. Group A shall consist of the main subject, or group of subjects, while Group B shall comprise the study of an ancillary subject or subjects appropriate to the main subject of study.

The following shall be the optional subjects for those taking the Bachelor of Arts Degree :—

Group A—Main

	Branch	I	:	History
	Branch	II	:	Political Science
Optional	Branch	III (*a*)	:	Social Sciences
subjects	Branch	III (*b*)	:	Sociology
B.A. Degree	Branch	IV	:	Economics
	Branch	V	:	Geography
	Branch	VI	:	Philosophy
	Branch	VII to XI	:	Omitted
(i)	Branch	XII—Languages	:	English.
(ii)	Branch	XII (*a*)	:	Tamil
	Branch	XII (*b*)	:	Specialised Tamil
	Branch	XII (*c*)	:	Specialised Course in Sanskrit and Tamil
	Branch	XIII	:	Indian Culture.

Group B—Ancillary

Any two of the subjects appropriate to the main subject of study prescribed from the following shall be offered by the candidates. This will not apply to Branch III (*a*) Social Sciences, Br. XII (*a*) Tamil Branch XII (*b*) Specialised Tamil and Branch XIII (*c*) Specialised course in Sanskrit and Tamil.

1. Political Science
2. Economics
3. Geography
4. Psychology
5. Commerce
6. Elements of Economic Statistics

7. History
8. Sociology
9. Languages
10. Indian Culture
11. Ethics
12. Comparative Religion
13. Philosophy.

Optional subjects B.Sc. Degree The following shall be the optional subjects for those taking the Bachelor of Science Degree :

Group A—Main

Branch	I	:	Mathematics
Branch	II	:	Omitted
Branch	III	:	Physics
Branch	IV	:	Chemistry
Branch	V	:	Botany
Branch	VI	:	Zoology
Branch	VII	:	Geology.

Group B—Ancillary

Any two of the following subjects shall be taken, the subjects depending upon the main subject chosen :

1. Physics
2. Chemistry
3. Statistics
4. Numerical Mathematics
5. Mathematics
6. Botany
7. Zoology
8. Geology
9. Physiology

Course of Study B.A. Degree

3. The course of study in each of the branches for candidates appearing for the B.A. degree shall be as follows :

(The syllabus prescribed for various courses is given separately as per the numbers given in the bracket).

Branch I—History

Group A

(*a*) Two compulsory papers in Indian History :—

History of India	:	Paper I *	(1)
History of India	:	Paper II *	(2)

* There will be compulsory map question in History of India Papers I and II.

(*b*) Two other papers to be chosen, taking not more than *one* from out of the following :

Section I

(i) History of Greece and Rome upto 395 A.D. (3)

(ii) History of Europe from 395 to A.D. 1500 A.D. (4)

(iii) History of Islam upto 1258 A.D. (5)

Section II

(i) History of America since 1776 A.D. (6)

(ii) Modern Asian History from 1850 A.D. to the present day. (7)

(iii) History of Europe from 1500 A.D. to the present day (8)

Section III

(i) History of Islam after 1258 A.D. (9)

(ii) The Political and Constitutional History of England upto 1603 A.D. (10)

(iii) The Political and Constitutional History of England from 1603 A.D. to the present day. (11)

Group B

Any two from the following :

(i) Politics :

(*a*) Political Theory or (12)

(*b*) Modern Governments (14)

(ii) Economics : General Economics (24)

(iii) Geography :

General Geography of the World 46(*a*)

Or

Principles of Human Geography 46(*b*)

Or

Regional Geography of the World and India. 46(*c*)

Branch II—Political Science

Group A

(*a*) (i) Political Theory, including one of the following texts : (12)

1. Selections from Arthasastra
2. Burke's Reflections on the French Revolution
3. Locke : Second Treatise on Civil Government

4. Macchiavelli : The Prince (World's Classics)

5. J. S. Mill : Representative Government

6. Selections from the Kural

7. Selections from Aquinas.

(ii) The Evolution of Government. (13)

(*b*) Two papers to be chosen from the following :

1. Modern Governments (Great Britain, France, U.S.A., U.S.S.R., Switzerland, India, Japan, Canada, Australia and Eire) (14)

2. Elements of Public Administration (15)

3. State and Government in Ancient India (16)

4. International Relations and Diplomacy (17)

5. The Constitutional and Administrative History of Modern India from 1600 A.D. (with documents) (18)

Group B

Any two from the following :

(i) History :

(*a*) History of Greece and Rome upto 395 A.D. (3)

Or

(*b*) History of Europe from 395 A.D. to 1500 A.D. (4)

Or

(*c*) History of Europe from 1500 A.D. to the present day. (8)

Or

(*d*) Political and Constitutional History of England upto 1603 A.D. (10)

Or

(*e*) Political and Constitutional History of England from 1603 A.D. to the present day (11)

Or

(*f*) History of America since 1776 A.D. (6)

(ii) Psychology : General Psychology (22)

(iii) Economics : General Economics (24)

Branch III (*a*)—Social Sciences

The candidates opting for this Branch shall take :

Sociology Paper I (19)
and Sociology Paper II (20)

as compulsory subjects and two other subjects from out of the following three sections, only one subject being chosen from any section.

Section I

(i) History :

(*a*) History of India—Paper II (2)

(*b*) History of Greece and Rome upto 395 A.D. (3)

(ii) Philosophy :

(*a*) Ethics (41)

(*b*) Philosophy of Religion (21)

Section II

(i) Politics :

(*a*) Political Theory including a text (12)

(*b*) Modern Governments (14)

(ii) Psychology :

(*a*) General Psychology (22)

(*b*) Social Psychology (29)

(iii) Anthropology :

(*a*) Social Anthropology (27)

(*b*) Cultural Anthropology (23)

Section III

(i) Economics :

(*a*) General Economics (24)

(*b*) Indian Economic Problems (32)

(ii) Geography :

(*a*) Principles of Human Geograpy 46(*b*)

(*b*) Social Geography of India (25)

Branch III (*b*)—Sociology

The candidate opting for this branch shall take the following papers :

Compulsory papers :

1. Principles of Sociology (26)
2. Social Anthropology (27)
3. Indian Social Institutions (28)
4. Social Psychology (29)

Group B—Ancillaries (Optionals)

1. Indian Economic Problems (common to Branch IV Economics) (32)
2. History of Indian Culture (common to Branch XIII Indian Culture) (44)

Branch IV—Economics

Group A

1. Principles of Economics (30)
2. Currency, Banking, International Trade and Public Finance (31)
3. Indian Economic Problems (32)
4. Modern Economic Development of the U.K., U.S.A., U.S.S.R. and Japan (33)

Group B

1. Elements of Economic Statistics (Compulsory) (47)
2. Any one of the following :
   1. History : History of India—Paper II (2)
   2. Politics : Modern Governments (14)
   3. Commerce : Principles of Commerce (48)
   4. Geography : Economic Geography (49)

Branch V—Geography

Group A

1. Principles of Human Geography and Regional Geography of India (34)
2. Physical Basis of Geography (35)
3. Regional Geography of the World (36)
4. Practical Geography and Practical Test (37)
   Two Practical Tests.

Group B

Any two from the following :

1. History : History of India—Paper I (1)
   History of India—Paper II (2)

   Paper I and Paper II : Common to Br. I—History Main

2. Elements of Economic Statistics, (common to B.A. Branch IV Economics) (47)

3. Economics : Principles of Economics (common to B.A. Branch IV Economics) (30)

4. Indian Economic Problems (common to B.A. Branch IV Economics) (32)

Branch VI—Philosophy Main

Group A

1. Essentials of Philosophy (Reality and Knowledge) (38)

2. Indian Philosophy (39)

3. Western Philosophy (40)

4. Ethics (41)

Group B

Any two of the following :

1. General Psychology (22)

2. Philosophy of Religion (21)

3. Indian Logic (syllabus will be prescribed later)

4. European Logic (syllabus will be prescribed later)

5. Sociology (syllabus will be prescribed later)

6. General Economics (24)

7. Politics (Syllabus will be prescribed later)

8. History (syllabus will be prescribed later)

Branch XII—Languages

Candidates shall select any one of the following languages :

English

The course shall comprise the study of the following :

Group A

1. Shakespeare
2. The Novel and the Drama
3. Prose
4. Poetry

Group B

5. History of English Literature and Literary Criticism
6. Social History of England

Branch XII (*a*)—Tamil

The course shall comprise the study of the following:

1. History of Tamil Literature
2. History of Tamil Nad and Culture
3. Prescribed Text-books I (Ilakkiam—I)
4. Prescribed Text-books II (Ilakkiam—II)
5. Grammar, Prosody and Poetics
6. History of the Tamil Language and Elements of Comparative Grammar of the Dravidian Languages.

Branch XII (*b*)—Specialised Tamil

1. Texts I
2. Texts II
3. Texts III
4. Grammar I
5. Grammar II

6. Grammar III

7. History of Language and Grammar

8. Inscriptions

Branch XII (*c*)—Specialised Course
in Sanskrit and Tamil

1. Sanskrit Texts I
2. Grammar I
3. Grammar III
4. Tamil Texts II
5. Tamil Texts III
6. History of Sanskrit Literature
7. History of Language—Dravidian and Indo-European
8. Sanskrit Grammar and Poetics.

[Grammar I, Tamil Texts II, Tamil Texts III and Grammar III will be common to Branches XII (*b*) and XII (*c*)]

Branch XIII—Indian Culture

Group A

1. Outlines of Indian Philosophy (in particular the parts dealing with Vedas, Upanishads and six systems of Indian Philosophy) (42)
2. Principles of Saivism and Vaishnavism (43)
3. History of Indian Culture (44)
4. Fine Arts including Temple Architecture, Painting, Sculpture, Music, Iconography (45)

Group B

1. Ethics (41)

2. Comparative Religion (50)

Course of Study B.Sc. Degree

4. The course of study for Part III in each of the Branches of the B.Sc. degree shall be as follows :

Branch I—Mathematics

Group A

1. Mathematics I—Algebra, Calculus and Geometry (1)

2. Mathematics II—Algebra, Trigonometry and Calculus (2)

3. Mathematics III—Vector Algebra, Calculus and Geometry (3)

4. Mathematics IV—Elements of Modern Algebra (4)

5. Mathematics V—Mechanics, Statics and Dynamics (5)

6. Mathematics VI—Astronomy (6)

Group B

Any two of the following according to the Syllabus prescribed :

1. Physics (32)

2. Chemistry (33)

3. Statistics (34)

4. Numerical Mathematics (if taken along with Statistics only.) (35)

Branch III—Physics

Group A

1. Part (i) Mechanics and Properties of matter
   (ii) Heat and Sound (7)
2. Thermodynamics and Statistical Mechanics (8)
3. Light (9)
4. Magnetism and Electricity (10)
5. Modern Physics (11)

Two Practical Tests.

Record.

Group B

The following two subjects according to the syllabus prescribed :

1. Mathematics (36)
2. Chemistry (33)

Branch IV—Chemistry

Group A

1. General Chemistry (12)
2. Organic Chemistry (13)
3. Physical Chemistry (14)
4. Inorganic Chemistry (15)

Two Practical Tests.

Record.

Group B

Two of the following according to the syllabus prescribed :

Physics (32)

with any one of the following :

Mathematics (36)

or

Botany (37)

or

Zoology (38)

Branch V—Botany

Group A

1. Morphology, Embryology and Cytology (16)
2. Thallophyta, Bryophytes, Plant Pathology and anatomy of Angiosperms (17)
3. Pteridophytes, Gymnosperms and Taxonomy of Angiosperms (18)
4. Physiology, Ecology, Evolution and Genetics (19)

Two Practical Tests.

Group B

Two of the following according to the syllabus prescribed :

Chemistry (33)

with any one of the following:

Zoology (38)

or

Geology (39)

or

Physiology (40)

Branch VI — Zoology

Group A

(i)	Invertebrata	(20)
(ii)	Chordata	(21)
(iii)	Embryology, Cytology and Genetics	(22)
(iv)	Ecology, Physiology and Evolution	(23)

Two Practical Tests

Records, specimens

Group B

Two of the following according to the syllabus prescribed :

Chemistry	(33)
with any one of the following:	
Botany	(37)
or	
Geology	(39)
or	
Physiology	(40)

Branch VII — Geology

Group A

(i)	Section A : Geomorphology Section B : Crystallography	(24)
(ii)	Section A : Cosmogony (General Geology) Section B : Palaeontology Section C : Mineralogy	(25)
(iii)	Section A : Stratigraphy Section B : Economic Geology Section C : Structural Geology	(26)
(iv)	Section A : Petrology Section B : Optical Mineralogy	(27)

Two Practical Tests.

Record.

Group B

Two of the following according to the syllabus psescribed :

Chemistry (33)

with any one of the following :

Physics (32)

or

Zoology (38)

Scheme of Examination Common for B.A. and B.SC. Parts I and II

4. (*a*) The Scheme of examination shall be as follows :—There shall be three papers each of three hours duration carrying 100 marks each.

Part I — Tamil

	Hours	Marks
At the end of the First Year		
Paper I—Prose and Drama	3	100
At the end of the Second Year		
Paper II — Poetry and Grammar	3	100
Paper III — Comprehension, Composition, History of Literature and Translation	3	100

(For the candidates whose mother tongue is not Tamil)

At the end of the first year		
One Paper	3	100
At the end of the second year		
One Paper	3	100

Part I — Malayalam

	Hours	Marks
At the end of the first year		
Paper I — Prose Detailed and Non-detailed texts	3	100
At the end of the second year		
Paper II — Poetry, Classical Drama and Grammar	3	100
Paper III — History of Malayalam Literature, Composition and Translation	3	100

Part I — Hindi

	Hours	Marks
At the end of the first year		
Paper I — Prose and Drama	3	100
At the end of the second year		
Paper II — Poetry	3	100
Paper III — Non-detailed, Translation and Composition	3	100

Part I — Arabic

	Hours	Marks
At the end of the first year		
Paper I — Prose, Poetry and Grammar	3	100
At the end of the second year		
Paper II — History of literature	3	100
Paper III — Translation and Composition	3	100

Part I — Urdu

	Hours	Marks
At the end of the first year		
Paper I — Prose, Poetry and Grammar	3	100
At the end of the second year		
Paper II — History of Literature	3	100
Paper III — Translation and Composition	3	100

Part I — Sanskrit

	Hours	Marks
At the end of the first year		
Paper I — Poetry, Prose and Grammar	3	100
At the end of the second year		
Paper II — Drama and Translation	3	100

(60 marks for Drama, 40 marks for Translation i.e., from Sanskrit to English 25 marks, English to Sanskrit 15 marks out of the 25 marks for translation from Sanskrit to English 15 marks should be allotted to passages from text and 10 marks for unseen passages.)

	Hours	Marks
Paper III — Poetics and History of Sanskrit Literature	3	100

Part I — French

	Hours	Marks
At the end of the first year		
Paper I—Prose	3	100
At the end of the second year		
Paper II—Poetry and Drama	3	100
Paper III—Translation and Essays	3	100

Part II — English

4. (*b*) There shall be four papers each of three hours duration carrying a maximum of **100** marks.

At the end of the first year

	Hours	Marks
Paper I—Twentieth Century Prose Grammar and Composition	3	100
Paper II—Poetry and Drama I	3	100
At the end of the second year		
Paper III—Twentieth Century Prose and Composition	3	100
Paper IV—Poetry and Drama II	3	100

Part III — Optional Subjects

Bachelor of Arts

4. (*c*) There shall be four papers of three hours duration in the main subjects under Group A, each carrying a Maximum of 100 marks and two papers in the subjects under Group B.

In the case of Branches III (*a*)—Social Sciences, there shall be six papers of three hours duration carrying a maximum of 100 marks each, two papers in each of the subjects chosen from the three different sections.

In the case of Br. V—Geography and the languages under Branch XII (*a*), (*b*) and (*c*), the number of papers and scheme of marks shall be as detailed under that branch.

The examinations under Part III optional subjects shall be taken as follows :

Branch I — History

	Hours	Marks
At the end of the first year		
One of the optional subjects under Group A	3	100

	Hrs.	Marks
At the end of the second year		
One of the Ancillary subjects under Group B	3	100
At the end of the third year		
History of India Paper I	3	100
History of India Paper II	3	100
Rest of the optional subject under Group A	3	100
Rest of the ancillary subject under Group B	3	100

Branch II — Political Science

	Hrs.	Marks
At the end of the first year		
Modern Governments	3	100
At the end of the second year		
One of the ancillary subjects under Group B	3	100
At the end of the third year		
Political Theory including the text prescribed	3	100
The Evolution of Government	3	100
Rest of the optional subject under Group A	3	100
Rest of the ancillary subject under Group B	3	100

Branch III (*a*)—Social Sciences

	Hrs.	Marks
At the end of the first year		
One of the papers in optional subject	3	100

(If History — History of Greece and Rome is taken.
If Politics — Modern Governments is taken.
If Psychology — General Psychology is taken.
If Economics — General Economics is taken).

	Hrs.	Marks
At the end of the second year		
One paper in the optional subject	3	100
At the end of the third year		
Sociology Paper I (Compulsory)	3	100
Sociology Paper II (Compulsory)	3	100
Rest of the Optional	3	100
Rest of the Optional	3	100

Branch III (*b*)—Sociology

At the end of the first year		
History of Indian Culture	3	100
At the end of the second year		
Indian Economic problems	3	100
At the end of the third year		
Principles of Sociology	3	100
Social Anthropology	3	100
Indian Social Institutions	3	100
Social Psychology	3	100

Branch IV — Economics

At the end of the first year		
Modern Economic Development of U.K., U.S.A., U.S.S.R., and Japan	3	100
At the end of the second year		
Elements of Economic Statistics under Group B	3	100
At the end of the third year		
Principles of Economics	3	100
Currency, Banking, Public Finance and International Trade	3	100

	Hrs.	Marks
Indian Economic Problems	3	100
Modern Governments or History of India Paper II or Principles of Commerce or Economic Geography (under Group B)	3	100

Branch V—Geography

At the end of the first year

	Hrs.	Marks
Group A		
Paper I—Physical basis of Geography	3	100
At the end of the second year		
Group B		
Optional	3	100
At the end of the third year		
Group A		
Paper II—Principles of Human Geography and Regional Geography of India	3	75
Paper III — Regional Geography of the World	3	75
Paper IV — Practical Geography and Practical Test :		
Practical I Test 60, Record 15	3	75
Practical II Test 60, Record 15	3	75
Group B		
Optional	3	100

Optionals : (Any two of the following subjects to be chosen by the colleges)

1. Elements of Economic Statistics (common to B.A. Economic major)

2. Indian Economic Problems
(Common to B.A. Economics major)

3. Principles of Economics
(Common to B.A. Economics major)

4. History of India—Paper I or Paper II
(Common to B.A. History major)

Branch VI—Philosophy Main

	Hrs.	Marks
At the end of the first year		
Essentials of Philosophy (Reality and Knowledge)	3	100
At the end of the second year		
One of the ancillary subjects under Group B	3	100
At the end of the third year		
Indian Philosophy	3	100
Western Philosophy	3	100
Ethics	3	100
Rest of the ancillary subject under Group B	3	100

Branch XII — English

At the end of the first year		
Paper V — Social History of England	3	100
At the end of the second year		
Paper II — Novel and Drama	3	100
At the end of the third year		
Paper I — Shakespeare	3	100
Paper III — Prose	3	100
Paper IV — Poetry	3	100
Paper VI — History of Literature and Literary Criticism	3	100

Branch XII (a)—Tamil

	Hrs.	Marks
At the end of the first year		
Prescribed Texts II (Ilakkiam II)	3	100
At the end of the second year		
History of Tamil Nadu and Culture	3	100
At the end of the third year		
History of Tamil Literature	3	100
Prescribed Texts I (Ilakkiam I)	3	100
Grammar, Prosody and Poetics	3	100
History of Tamil language and elements of Comparative Grammar of the Dravidian languages	3	100

Branch XII (*b*)—Specialised Tamil

At the end of the first year		
Paper I—Texts I	3	100
Paper II—Grammar I	3	100
At the end of the second year		
Paper III—Texts II	3	100
Paper IV—Grammar II	3	100
At the end of the third year		
Paper V—Texts III	3	100
Paper VI—Grammar III	3	100
Paper VII—History of Language and Grammar	3	100
Paper VIII—Inscriptions	3	100

Branch XII (*c*)—Specialised course in Sanskrit and Tamil

	Hrs.	Marks
First year		
Paper II—Grammar I	3	100
Second and Third year		
Paper I—Sanskrit Texts	3	100
Paper III—Tamil Texts II	3	100
Paper IV—History of Snaskrit Literature	3	100
Paper V—Tamil Texts III	3	100
Paper VI—Grammar III	3	100
Paper VII—History of Language Dravidian and Indo-European	3	100
Paper VIII—Sanskrit Grammar and Poetics	3	100

Note :—Papers II, III, V and VI of this group will be common to Branch XII (*b*)—Specialised Tamil and Branch XII (*c*)—Specialised course in Sanskrit and Tamil.

Branch XIII—Indian Culture

	Hrs.	Marks
At the end of the first year		
History of Indian Culture	3	100
At the end of the second year		
One of the ancillary subjects under Group B	3	100
At the end of the third year		
Outlines of Indian Philosophy	3	100
Principles of Saivism and Vaishnavism	3	100
Fine Arts including Temple Architecture, Painting, Sculpture, Music and econography	3	100
Rest of the ancillary subject under Group B	3	100

Bachelor of Science

4. (*d*) The scheme of examination for Part III in each of the Branches of B.Sc. degree shall be as follows :

Branch I—Mathematics

	Hrs.	Marks
At the end of the first year		
Paper I—Algebra, Calculus and Geometry	3	100
At the end of the second year		
Paper II—Algebra, Trigonometry and Calculus.	3	100
One of the ancillary subjects under Group B		
At the end of the third year		
Paper III—Vector Algebra, Calculus and Geometry	3	100
Paper IV—Elements of Modern Algebra	3	100
Paper V—Mechanics, Statics and Dynamics	3	100
Paper VI—Astronomy	3	100
Rest of the ancillary subject under Group B.		

Group B

(i) Physics

	Hrs.	Marks
Paper I—Mechanics, General Physics and Heat	3	50
Paper II—Sound, Light, Magnetism, Electricity, Modern Physics	3	50
Practical	3	40
Record		10
Total		150

(ii) Chemistry

	Hrs.	Marks
General, Physical and Inorganic Chemistry	3	60
Organic Chemistry	2	40
Practical	3	40
Record		10
	Total	150

(iii) Statistics

Statistics I	3	50
Statistics II	3	50
Statistics practical	3	50
	Total	150

(iv) Numerical Mathematics

Numerical Mathematics Paper I	3	75
Numerical Mathematics Paper II	3	75
	Total	150

Branch III—Physics

At the end of the first year

Paper I Part (i)—Mechanics and Properties of Matter		
Part (ii)—Heat and Sound	3	80

At the end of the second year

One of the Ancillary subjects

At the end of the third year

	Hrs.	Marks
Paper II—Thermodynamics and Statistical Mechanics	3	80
Paper III—Light	3	80
Paper IV—Magnetism and Electricity	3	80
Paper V—Modern Physics	3	80
Rest of the Ancillary subject		
Practical I—Mechanics, Properties of Matter, Heat and Sound	3	80
Practical II—Light, Magnetism and Electricity	3	80
Record		40

Group B

(i) Mathematics

Paper I	3	75
Paper II	3	75

(ii) Chemistry

The same as for Group B—Chemistry under Branch I—Mathematics.

Branch IV—Chemistry

	Hrs.	Marks
At the end of the first year		
Paper I—General Chemistry	3	100
At the end of the second year		
One of the Ancillary subjects		
At the end of the third year		
Paper II—Organic Chemistry	3	100
Paper III—Physical Chemistry	3	100
Paper IV—Inorganic Chemistry	3	100
Rest of the Ancillary subject		
Practical I	6	200 (including records 20 marks)
Practical II	6	

Group B

(i) Mathematics

The same as for Group B—Mathematics under Branch III—Physics.

(ii) Botany

	Hrs.	Marks
Theory I—Thallophytes, Bryophytes, Pteriodophytes, Gymnosperms and Histology	2	50

	Hrs.	Marks
Theory II—Morphology and Taxonemy of Angiosperms, Plant Physiology and General Principles	2	50
Practicals	3	40
Records		10
	Total	150

(iii) Zoology

Written I — Invertebrata	2	50
Written II — Chordata and General Principles	2	50
Practicals	3	40
Records		10
	Total	150

Branch V—Botany

At the end of the first year

Paper I — Morphology, Embryology and Cytology	3	100

At the end of the second year

One of the Ancillary subjects.

	Hrs.	Marks
At the end of the third year		
Paper II — Thallophytes Bryophytes plant, Pathology and Anatomy of Angiosperms	3	100
Paper III — Pteridophyte, Gymnosperm and Taxonomy of Angiosperms	3	100
Paper IV — Physiology, Ecology, Evolution and Genetics	3	100
Rest of the Ancillary subject		
Practical I	3	80
Practical II	3	80
Plant Collection		10
Slides		10
Records		20

Group B

(i) Chemistry with any one of the following:

(ii) Zoology
or
Geology
or
Physiology

(i) Chemistry

The same as for Group B—Chemistry under Branch I—Mathematics.

(ii) Zoology

The same as for Group B—Zoology under Branch IV—Chemistry

or

(iii) Geology

	Hrs.	Marks
(1) Written Examination		
Paper I — All divisions other than Mineralogy and Petrology	2	50
(2) Written Examination		
Paper II — Mineralogy and Petrology	2	50
Practical Examination — Crystal Models, Fosils, Minerals, Rocks and Map	3	40
Record		10
Total		150

Written Examination		
Paper I	2	50
Paper II	2	50
Practical	3	40
Record		10
Total		150

Branch VI—Zoology

At the end of the first year

Paper I Invertebrata	3	100

At the end of the second year

One of the Ancillary subject

At the end of the third year

Paper II Chordata	3	100

	Hrs.	Marks.
Paper III Embryology, Cytology and Genetics	3	100
Paper IV Ecology, Physiology and Evolution	3	100
Rest of the Ancillary subject.		
Practical I	3	80
Practical II	3	80
Laboratory note books		
Records		25
Specimens		15

Note:—The third year B.Sc. Zoology main students will have to submit 15 Zoological specimens in addition to their record books. The marks assigned for records and specimens is as follows :

Records	:	25
Specimens	:	15

Procedure to be followed for submission of specimens :

All 15 specimens preserved in suitable containers such as bottles, specimen tubes etc., should be numbered 1—15 and the details of those specimens such as the names, systematic position habited and date of collection should be entered in the field book, which should accompany the collection. The entire set of 15 specimens of an individual student should be submitted in a special box with the register number of the candidate, written on the top. The nature of the box to contain all the 15 specimens is left entirely to the colleges.

Group B

(i) Chemistry

With any one of the following :

(ii) Botany

or

(iii) Geology

(i) Chemistry

The same as for Group B—Chemistry under Branch I—Mathematics.

(ii) Botany

The same as for Group B—Botany under Branch IV—Chemistry

or

(iii) Geology

The same as for Group B—Geology under Branch V—Botany

or

(iv) Physiology

The same as for Group B—Physiology under Branch V—Botany

Branch VIII—Geology

	Hrs.	Marks
At the end of the first year		
Paper I Section A—Geomorphology Section B—Crystallography	3	100
At the end of the second year		
One of the Ancillary subjects		

At the end of the third year	Hrs	Marks
Paper II Section A—Cosmogony, General Geology Section B—Palaentology Section C—Mineralogy	3	100
Paper III Section A—Stratigraphy Section B–Economic Geology Section C—Structural Geology	3	100
Paper IV Section A—Petrology Section B—Optical Mineralogy	3	100
Rest of the Ancillary paper		
Practical I—Crystallography, Mineralogy, (Physical) and Palaentology	3	80
Practical II—Petrology—megascopic and microscopic, Ores—blow pipe, Maps	3	80
Laboratory		20
Specimen		20

Group B

Chemistry

With any one of the following :

Physics

or

Zoology

or

Mathematics

(i) Chemistry : The same as for Group B—Chemistry under Branch I—Mathematics.

(ii) Physics : The same as for Group B— Physics under Branch I—Mathematics.

or

(iii) Zoology : The same as for Group B—Zoology under Branch IV—Chemistry

or

(iv) Mathematics : The same as for Group B—Mathematics under Branch III—Physics.

Conditions of Eligibility of A Candidate For the Degree

5. No candidate shall be declared eligible for the Degree of Bachelor of Arts or Bachelor of Science unless he has completed the course of study prescribed and passed the examinations in the several subjects contained in the course of study as detailed in the regulations.

6. A candidate shall not be declared eligible for the Degree of Bachelor of Arts or Bachelor of Science unless he has passed the examination in the selected language under Part I, in English under Part II and in the selected Optional group under Part III.

Provided also that the ' Pulavar ' title holders of this university or of any other university accepted by the Syndicate as equivalent thereto, who subsequently pass Part II—English of the B.A. degree examination under proviso 9(iv) M.A. degree examination—(B-i) and (B-ii) of Chapter XXXIX of Part I of Vol. II of the Madurai University Calendar shall be awarded the B.A. degree under the Faculty of Arts, having been exempted from Part I and III of the degree course.

Marks for a pass and Qualification of successful Candidates

7. A candidate for the Degree of Bachelor of Arts or Bachelor of Science shall be declared to have passed if he/she satisfies the following :

Part I—Tamil or any other selected language

Those who have obtained 35 % of marks in that paper or 35% of marks taken together in the papers in that year are considered to have passed in that paper or in that year.

For purpose of classification, the total number of marks obtained in all the papers under Part I in the aggregate will be taken into consideration.

Part II—English

Those who have obtained 35% of marks in both the papers taken together at the end of the first year are considered to have passed in that year.

Those who have obtained 35 % of marks in both the papers taken together at the end of the second year are considered to have passed in that year.

For purpose of classification, the total number of marks obtained in all the four papers under Part II in the aggregate will be taken into consideration.

Part III

Those who have obtained 35% of marks in the paper or in the papers taken together in the aggregate in that year are considered to have passed in that paper or that year.

In the case of B.A. Branch XII(*b*) Specialised Tamil and Branch XII(*c*) Specialised Course in Sanskrit and Tamil, the following is the regulations :—

Candidates who obtain 35 percent of marks in each of the papers taken at the end of I, II, and III year examinations respectively in Part III-B.A. Branch XII(*b*) Specialised Tamil and Branch XII(*c*) Specialised Course in Sanskrit and Tamil, shall be declared to have passed the examination in that year and in case a candidate fails in one paper or papers at the end of I, II and III year, he may appear again in the failed papers only.

(i) **Practicals :**

Part III—Group A Main—Science subjects

Minimum marks for pass :

The candidates should obtain a minimum of 35 per cent of marks in aggregate in the practical examination separately in the subject concerned.

(ii) **Practicals :**

Part III—Group B—Ancillaries—Science Subjects

Minimum marks for pass :

The candidate should obtain an aggregate (both written and practical put together) minimum of 35 per cent in the ancillary subject concerned.

For purpose of classification, the total number of marks obtained in all the papers under Part III in the aggregate will be taken into consideration.

8. Candidates who obtain 60 per cent or above of the total marks in any one of the Parts I, II and III shall be placed in the first class in that part.

Classification of successful Candidates.

Successful candidates who obtain less than 60 per cent but not less than 50 per cent of the marks in any of the parts I, II and III shall be placed in the Second Class. All other successful candidates in Parts I, II and III shall be placed in the third class.

Statement of marks.

9. Statement of marks shall be furnished.

10. (i) A candidate who has passed B.A. (Special) or B.Sc. (Special) shall be permitted to appear and qualify for Parts I and II of the B.A./B.Sc. general privately without waiting for any period after taking the respective degrees.

(ii) A candidate who has passed B.Sc. (Home Science) degree examination on or before 1973 shall be permitted to appear and qualify for Parts I and II of B.A./B.Sc. general privately.

(iii) A candidate who has passed B.A. with any subject other than History and Geography shall be permitted to appear and qualify for Part III B.A. History Main privately so as to enable him/her to join the B.Ed. course in History. He/She need not appear for ancillary subjects under Branch I History of the B.A. degree course.

(iv) A candidate who has passed the B.Com. degree examination shall be permitted to appear and qualify for Parts I and II of the B.A./B.Sc. general and B.A. Part III History main privately

so as to enable him/her to join the B.Ed. course in History. He/She need not appear for ancillary subjects under Branch I History of the B.A. degree course.

(v) Candidates who have passed the examinations under the above categories shall not be issued separate diplomas but separate certificates indicating the pass in the additional subject or subjects shall be issued to them.

Such candidates under the above categories shall be placed in a separate list. They shall not be elgible for any prize or medal awarded by the University.

Such candidates should apply for exemption under this regulation in the prescribed form with the fee of Rs. 25/- on or before 30th September for April examination and 28th February for September examination.

The above rules may be applicable to all candidates irrespective of whether they have passed from this University or from the Universities recognised by this university but residing within this University area.

Regulations permitting Candidates who have taken the B.A. or the B.Sc. to Qualify in an additional language under Part I or in an additional subject under Part III.

11. A candidate who has passed the B.A. or B.Sc. degree examination will be permitted to take an additional language under Part I, provided the candidate puts in attendance for one academic year in a college affiliated to or recognised by this university in the language concerned for the Degree and passes the examinations in that language under the revised Scheme of examination.

12. A candidate who has passed the B.A. Degree examination taking a language under Branch XII will be permitted to appear in another language under Part III, provided the candidate undergoes a course of study in the language in a college affiliated to or recognised by this university in that language for a period of not less than two academic years and sits for the examination, in all the subjects pertaining to that language under Part III, if the language offered is one other than the languages offered under Parts I and II of the B.A. degree examination already passed by him/her. If the language offered under Branch XII (*a*) or (*b*) or (*c*) is one or other of the languages offered under Part I or Part II, he/she shall be permitted to take the examination in the new language under Part III after a period of study extending over one academic year.

13. A candidate who has qualified for the B.A. or B.Sc. degree shall be permitted to take an additional subject under Part III provided he/she puts in a course of study in the subject for not less than one academic year in a college affiliated in that particular subject and undergoes theoretical and practical instruction in that subject. All such candidates who take up additional subjects and qualify for the same shall be graded according to their performance at the examination.

14. A candidate who has qualified for the B.A. degree can take a Major subject under Part III for the B.Sc. provided he puts in attendance for a period of two years, if he/she wishes to qualify in a subject under the B.Sc.

15. A candidate who has qualified for the B.Sc. degree may qualify in a subject under Part III of the B.A. degree, provided he/she puts in attendance of not less than one year.

16. Candidates who have undergone the course of study for two academic years in the three year degree courses other than B.B.A. and B.Mus. under the old regulations of this university shall be permitted to continue

their third year study after joining in a college to appear for the final year examinations under the revised scheme. Such candidates shall be permitted to take all the papers in the Major subject under Part III at the final year examination.

17. In the case of candidates who have passed the examination in Pre-University course Group C and B.A. Branch XII(*b*) Specialised Course in Tamil before the introduction of Part I Tamil be exempted from taking Part I Tamil and that they may be admitted for their further studies to B.A. or M.A. degree courses respectively.

18. A candidate who has qualified for the B.Sc. may be permitted to take up a subject in which he has previously qualified, provided he puts in an attendance for a period of not less than one academic year of three terms in a constituent or affiliated college and appears for Parts I and II of the B.Sc. as well as for Part III of the optional group.

Transitory Provision :

Candidates who appeared and failed in Part II English of the B.A./B.Sc. degree examination under the following scheme of examination (both first and second year) held in 1970, 1971 and 1972 will be permitted to appear and follow the same scheme,* syllabus and text-books upto the examination of April/September 1974.

*Scheme of Examination

Paper I —	Poetry and Drama	I Year
Paper II —	Prose and Composition I	I Year
Paper III —	Shakespeare and Poetry	II Year
Paper IV —	Prose and Composition II	II Year

Candidates who appeared and failed in Part II English of the B.A./B.Sc. degree examination under the old scheme (all the four papers taken together at the end of the 2nd year) held in 1969 or earlier will be permitted to appear under the above transitory provision or permitted to appear for all the four papers together till the examination of April/September 1974.

SYLLABUS

Part I—Languages

Tamil

Grammar :

The following syllabus is prescribed :

Sandhi—Valleluttu mikumitam, mikavitam.

Na-Na, La-Là Tirupukal.

Utanpatu mey.

Kurriyalukaram Ketal.

Vaikaram : Tondral, Toridal, Keduthal.

Ceyyul Vikaram aru.

Mudakkurai, Idakkurai, Kadakkurai.

Chorrodavikkurai : Vinai, Peyar, Vina, Payanilaiyatal.

Verrumaittokai Alvalittokaikal.

Tamil marapum pira marapum.

Ankilaccorrotarai otti amaintha tavarana valakkukal.

Valuvamaithikal, Kalavaluvamaithi.

Itavaluvamaithi.

Palvaluvamaithi-Matippuppanmai.

Marapuvaluvamaithi.

Irattaikkilavi.

Atukkuttotar.

Ennummai, Eccavummai, Murrummai, Izhivuchirappu, Uyarvuchirappu.

Cholliyal : Peyar, Tinai, Pal unarttum murai-Vikutikal.

Vinai-Kalam unarttum murai-Itainilaikal.

Peyareccam-Vinaiyeccam-Murrecham.

Eval Viyankol Vikutikal.

Tolirpeyar-Vinaiyalanaiyum peyar.

Palpaka akrinai, Cati orumai.

Cheyappattuvinai valankum murai.

Pakupata uruppukal.

Idaichol-Urichol-Ticaichol-Vadachol.

Akupeyar (Vakaikalainthu).

Itaiccorkal.

Porul : Akam-Elu tinai, Mutal, Karu, Uri.

Puram-Panniru tinai.

Tinai Mayakkam, Eluthu, Acai, Cir, Talai, Ati, Totai.

Yappu : Venba-Kural Venba-Asiriyappa.

Viruttam, Kalithurai, Kattalaikkalithurai.

Ethukai, Monai, Muran Totaikal.

Meyppatukal : Encuvaimattum.

Ani : (Vakaikal Venta).

Thanmai.

Uvamai.

Uruvakam.

Verrumai.

Verrupporulvaippu.

Tarkuripperram.

Piritumolital (Ottu).

Pinvarunilai.

General Composition :

A General History of Tamil Literature, Comprehension and Translation—

Books recommended for "A General History of Tamil Literature"

1. Sankakalat Tamilum Pirkalat Tamilum by Dr. U. V. Swaminatha Aiyar.
2. Tamil Ilakkiya Varalaru by S. Ramaswami Naidu.
3. History of Tamil Literature by S. Vaiyapuri Pillai.
4. Ilakkiya Varalaru by K. Subramanya Pillai.

Note :— (1) Questions should not be based on these texts but should be of general nature on the History of Tamil Literature. Questions should not be asked to fix the dates of authors, etc.

(2) There shall be four parts in the question paper for Paper III, the First Part on *General Composition*, the Second Part on *A General History of Tamil Literature*, the Third Part on *Comprehension* and the Fourth Part on *Translation*. There shall be one question on *General Composition*, two on *A General History of Tamil Literature*, one on *Comprehension* (*Tamil*) and one on *Translation* from English to Tamil. Marks shall be distributed for the four parts in the proportion of 20 : 40 : 20 : 20.

Poetical Selections will be published by the University.

Prose and *Drama* will be prescribed from time to time.

Tamil

For the students joining the degree course without knowledge of Tamil

I. First Year :

1. Spoken Tamil.

   Familiarizing the student with the fundamental vocabulary Conversation—Alphabets.

   Spelling and reading printed words.

2. Reading and writing words and simple sentences.

3. Nouns—declensions.

   Verbs—Conjugations.

   Demonstratives and Interrogatives and Simple sandhis.

4. Writing simple letters.

5. Reading news items and stories.

6. A book in simple language (biography or story).

7. Translation from Tamil to English and English to Tamil.

8. Conversation and reading exercises enabling and Morphology using some prose text of 7th or 8th standard.

9. Teaching the principles of Phonology and Morphology using some prose text of 7th or 8th standard.

10. Poetry from (1) Bharathi (2) Bharathi Dasan (3) D.V. Namakkal etc. 50 to 60 lines.

11. (*a*) Composition exercises.

    (*b*) Translation from Tamil to English and English to Tamil.

II. Second Year :

1. A short novel
2. Poetry — Valthu — Aravurai — Seiyyutkatai — Thanippaadal 80 to 100 lines.
3. N.D. texts prescribed for matric exam.
4. Composition.
5. Translation.

Books for reference :

1. A progressive grammar of common Tamil—A. H. Arden (C.L.S. Madras).
2. A Graded Tamil Reader by R. E. Asher and R. Radhakrishnan, Annamalai University.
3. A Guide to Tamil (By the direct method) by P. Jothimuthu (C.L.S. Madras).
4. Conversational Tamil— By N. K. Raja and K. Doraisamy (Annamalai University).
5. A Standard Grammar of Modern and Classical Tamil By Dr. M. Andronov (N.C.B.H.).
6. A Tamil Reader for Beginners — Parts I and II By M. S. Pillai.
7. A Progressive Grammar for Tamil— A. H. Arden (C.L.S. Madras).

Malayalam

Poetry Classical :

(1) About 150 to 200 lines from the works of Niranam poets.

(2) About 400 lines from the works of Ezhuthacchan or Cherusseri or one part of a Sandesa Kavya or about 100 stanzas from any of the Manipravala kavyas or not more than 2 sargas from a Mahakavya.

(3) An Attakkatha

(4) A classical drama

(5) One khanda Kavya

(6) Poetical selections from the work of a modern poet or poets not exceeding 300 lines.

Detailed prose :

(7) Prose text

Non-detailed study :

(1) Two books one of which may be a fiction.

(2) Original Composition.

(3) Translation from English to Malayalam.

A study of the outlines of the History of Malayalam language and literature.

HISTORY OF MALAYALAM LITERATURE :

(The scope of the subject is limited as indicated by the topics specified below. The intention is to give the students a general understanding of the evolution of the Malayalam Language and Literature. A few lectures, not exceeding six, may be arranged on each topic).

1. An introductory survey of the relationship of Malayalam with Tamil and Sanskrit. Their influence on Malayalam Literature. Origin of Pattu and Manipravala.

2. Pre-Examination Period in Poetry. (General survey with short references to Vadakkan Paattukal, Niranam Poets, Cherusseri and later Manipravala Poems).

3. Bhakthi period - (with special reference to Ezhuthacchan and his works).

4. Atta kkathaSchool of Poetry - (Works of Kottayam, Unnayi Varier and Irayimman Thampi).

5. Kunjan Nambiar and his works.

6. Kodungalloor school of Poetry.

7. Kerala Varma Period in Poetry.

8. Origin and Development of Romantic Poetry (Raja Raja Varma, V. C. Balakrishna Panicker, Asan, Vallathol and Ulloor.)

9. General Survey of the trends in Malayalam poetry in the post Asan period.

10. Evolution of Malayalam Drama (with special references to Bhasa Nataka Prasthanam and modern Prose - Drama).

11. Evolution of prose in general from the Kerala Varma period onwards.

12. Evolution of Malayalam Novel and short story.

A. FOR TEACHERS :

Kerala Sahitya Charithram - Ulloor.

B. FOR STUDENTS :

1. Sahitya Charitram Prasthanangaliloote — Dr. K. M. George

2. Kairaliyute Katha — N. Krishna Pillai

3. Malayala Sahitya Charitram — P. K. Parameswaran Nair

4. Malayala Sahityam — A. D. Hari Sarma

POETICAL SELECTIONS will be published by the University.

Other text-books will be prescribed by the University from time to time.

Hindi

The course shall comprise the study of :

(i) Representative selections from ancient and modern poetry from Kabir to the present day.

(ii) Selections from Modern prose from Bharatendu to the present day.

(iii) A Drama and a collection of one-act plays.

(iv) A Novel and a representative selection of short stories.

(v) History of Literature from Adikal to the present day. Knowledge of the Chief Characteristics of the four periods together with their sub-divisions, and the important poets alone is expected.

(vi) The following Alankaras and Chandas :

Alankaras : Anupras ; Shlesh ; Yamak ; Vakrokti ; Upama ; Utpreksha ; Roopak ; Atishayokti ; Ananvaya ; Arthantaranyas ; Virodhabhas ; Drishtant and Udaharan.

Chandas : Doha ; Choupayee ; Soratha ; Baravai ; Harigeethika ; Rola ; Indravajra ; Upendravajra ; Vanshast ; Mandakranta ; Malini ; Saviya ; Kavitt and Chappay ; and Nava Rasa.

(vii) Grammar which shall be limited to the matter contained in Vyakarana Pradeep by Ram Dev.

(viii) Translation from English to Hindi.

(ix) General Composition.

(x) A text-book in Hindi bearing on the ancillary subject where there is one.

Texts will be prescribed by the University from time to time.

Arabic

The course shall comprise the study of the poetry of the period of Jahiliyyah and of the Early Islamic and Abbaside periods ; the Quraan the Ahadith and short stories relating to the Arab life and culture ; Grammar, translation and principal movements in the History of Arabic literature.

Text-books will be prescribed from time to time.

Urdu

The course shall comprise the detailed and non-detailed study of Urdu literature both prose and poetry as developed during the period 1800-1950 ; Grammar, prosody, translation and principal movements in the History of the Urdu language and literature.

Text-books will be prescribed from time to time.

Sanskrit

The course shall comprise the study of text-books, grammar, translation and History of literature.

Text-books shall be as follows :—

(i) Poetry : About 200 verses.

(ii) Prose : About 60 pages.

(iii) Drama : One play only.

(iv) Poetics : About an easy selection.

French

One Classical Drama.

Poetry : 1,000 lines.

Prose : Two books of which one should be a novel.

Part II—**English**

B.A./B.Sc. & B.Sc. (Home Science) and B. Mus. Degree Courses

Preamble :

The Pre-University Syllabus in English at this University was completely changed within the last two years. Most of those who decided on the revision were teachers of English who loved the old syllabus and would have been happy to retain it if only, in actual practice, it had not led to a very pitiable travesty of the objectives it was intended to achieve. Also the re-orientation of the syllabus towards elementary mastery of the language skills was decided upon only when it became apparent that it was in vain to hope something would be done at the " School level " to lay a fairly sound foundation for the kind of study of English texts that was expected at the " College level ".

With the introduction of the new Pre-University syllabus it should be possible to make sure that students would acquire the necessary skills in the Pre-University Class to be able to pursue a higher course of study in English in the B.A./B.Sc. classes. Even so, they could not be expected to attain proficiency in the writing of full length critical or even simple essays on their texts in the course of nine months. Any demand for the writing of such exercises would throw them and their teachers back on the old unsound practice of substituting memorised answers for the exercise of acquired language skills. Teaching experience has also shown that the average student has not much difficulty in following the explanation of texts in the class, but only in constructing his own answers to the type of questions set for him in the examination. What is needed therefore, is not so much a drastic revision of the syllabus in terms of prescribed texts as in those of the objectives of teaching them in the class room and the kind of tests and examinations based on them. The revision should be such as to make it possible for only those who acquire mastery of language skills to pass the examinations. It is on this Principle that the following scheme of study and examinations has been drawn up by the Board of Studies in English.

I. Aims of the B.A./B.Sc. English Course :

The course should aim both at the further development of the language skills acquired by students in the Pre-University class and at the introduction of students to English literature through the study of a few of the finest compositions in prose, poetry and drama in English literature.

These two aims of the study of literature and language can really never be completely separated except in a technical study of language. For, in the last analysis, good literary composition in writing that conveys meaning or significance most effectively. Hence in the B.A./B.Sc. syllabus the two aims are to be held and pursued together, as far as possible in every part of the syllabus.

II. The Syllabus :

The course will comprise the following :

(*a*) Language study (first year).

(*b*) Study of 20th century Prose (first year).

(*c*) Introduction to the Classics - Poetry, Drama and Pre-twentieth century Prose (both years).

(*d*) Extensive Reading (both years).

A. LANGUAGE STUDY

1. AIMS :

SPEAKING :

1. The ability to ask and answer simple questions.

2. The ability to comprehend every day English as spoken by an Educated speaker, and to understand talks radio broadcasts, of general interest and on subjects connected with the student's studies.

3. The ability to express simple ideas and to convey simple information so as to be understood by other educated persons.

READING :

1. The ability to read independently and with comprehension, suitable material from text-books and extensive readers.

2. The ability to read independently books and magazines for a wider understanding of the student's optional subjects.

WRITING :

The ability to express simple ideas with clarity and in correct English.

2. SYLLABUS FOR LANGUAGE STUDY :

1. Vocabulary (I and II years) (Based on the prescribed detailed texts). A mastery of over, 5,000 common words in context.

2. Sentence types (I year only)

Simple sentence (exclamatory, assertive, affirmative, interrogative, negative).

Compound sentence ; Complex sentence (various types).

3. Phrases (I year only)

Noun Phrase—Verb Phrase

Adverbial Phrase (Prepositional Phrase included).

4. Word structure : (I year only)—(to be based on the 20th century Prose Text).

Prefix, suffix, inflection, derivation.

5. Usage (I year only).

6. (*a*) Vocabulary (To be based on the 20th century Prose Text).

(i) Single words for groups of words ;

(ii) Words denoting a collection ;

(iii) Antonyms, synonyms, homonyms ;

(iv) Words used in different senses ;

(v) Words confused and misused ;

(vi) Compound words.

(*b*) Syntax (I year only) (to be based on the 20th century Prose Text).

1. Transformation of Senten ces—Interchange of :

(i) Exclamatory and assertives ;

(ii) Interrogative and assertive ;

(iii) Negative and affirmative ;

(iv) Simple, compound and complex ;

(v) One part of speech for another ;

(vi) Direct and Indirect speech ;

(vii) Voice.

2. Synthesis of Sentences—To combine two or more simple sentences into.—

(i) a simple sentence ;

(ii) double or multiple sentence ;

(iii) a complex sentence.

(*c*) Idioms and Phrases (confined to 20th century Prose Text) (I year only.)

Use of idioms and phrases in sentences of the student's own.

(*d*) Word order, concord, tense forms.

(*e*) Composition (I and II years) (i) Story-writing ; (ii) Summarising (including epitomization) ;

(i) Paragraph/Letter writing ;

(ii) Essay writing ;

(iii) Expansion of proverbs, statements, etc.

3. BOOKS RECOMMENDED :

1. Books for the students :

(*a*) Advance Learner's Dictionary for Adult Learners by Hornby et al.

(*b*) Examine your English by Mason (Orient Longmans.)

(*c*) Extensive readers.

2. Books and Journals for the teachers :

(*a*) Forrester, Jean : Teaching without Lecturing, oup., 1968.

(*b*) Mackay, W.F. Language Teaching analysis, Longmans, 1966.

(*c*) Allen, W. Standard : Living English Structure, Longmans, 1967.

(*d*) Praniskas, Jean : Rapid Review of English Grammar, Prentice Hall, 1967.

(*e*) Zandvoot, R.W. : A Hand book of English Grammar, Longmans, 1967.

(*f*) Hornby, A.S. : A Guide to English Patterns, Up.

(*g*) Roberts Paul : English Syntax, Harcourt, Brace and World, 1964.

(*h*) Roberts Paul : Modern Grammar, Harcourt, Brace and World, 1964.

(*i*) George, H. V. : 101 Substitution Tables,

(*j*) Jones, Daniel : English Pronouncing Dictionary, Macmillan.

(*k*) General Service List :

(*l*) Ministry of Education, Govt. of India, Study Group Report, 1965.

(*m*) British Council World Lists.

(*n*) English Language Teaching (Journal) OUP.

(*o*) Language Learning (Journal).

4. METHODS:

1. Grammar and usage is taught only in the 1st year. Grammar exercises, such as transformation and synthesis of sentences should be used for comprehension and use of those patterns effectively. While teaching the structure of a simple sentence its different parts should be taught in detail. Special attention should be paid to areas which are particularly difficult to Indian students, such as articles, tense forms, propositions and phrasel verbs. As far as possible, examples and exercises should be chosen from the intensive readers.

2. Teaching ' how to write a paragraph ' should be methodically done, and the different methods of developing a paragraph should be taught step by step. The methods thus employed should from a basis for teaching ' how to write an essay '.

3. Written exercises should be carefully scrutinized and marked. Remedial teaching should follow correct work.

Marks should be awarded for accuracy of English, arrangement of thoughts and facts and suitability of expression to the topic.

B. TWENTIETH CENTURY PROSE

1. AIMS :

(i) To provide good reading material for language teaching through prose and train students to express simple ideas in English ;

(ii) To familiarise the students with the prose of the present day ; which serves to convey thoughts and ideas.

(iii) To present good examples of idiomatic English prose written on different subjects and the important problems that confront our generation.

2. SYLLABUS :

About 80 pages from a good anthology of 20th century writing by masters of English prose.

The prose chosen should be educative and make pleasant reading. In the choice of text-books preference may be given to anthologies which have exercises at the end of every lesson for language learning.

C. CLASSICS

1. AIMS :

The students should get generally acquainted with some of the best works of English literature. The study of the prescribed pieces should enable them not only to enjoy and appreciate the pieces but also to refine their emotions and kindle their imagination.

2. SYLLABUS :

(*a*) Poetry : Selections from one or two anthologies of poems not more than 250 lines being prescribed from one poet.

For I year about 700 lines.

For II year about 800 lines.

Total : about 1,500 lines.

(*b*) Prose : Pre-Twentieth Century.

Selections of a total of about 100 pages from suitable collection of prose pieces.

(*c*) Drama : I year : A volume of one-act plays or a modern play.

II year : A play by Shakespeare.

D. EXTENSIVE READERS

1. AIMS :

(i) To help in the process of unconscious imitation in language learning ;

(ii) To enable the students to form the habit of reading widely ;

(iii) To create self-reliance in Reading in the student ;

(iv) To develop a taste for reading Fiction in the student.

2. SYLLABUS :

Quite interesting, useful, simple and enjoyable books must be prescribed for extensive reading. Abridged and unabridged novels, biographies, autobiographies, anthologies of short stories and plays and stories of adventure and travel can be prescribed. Abridged novels (not retold) may be prescribed for the first year and original ones for the second year. About 800 pages of reading material can be prescribed for the first year and about 1,000 pages for the second year. The following pattern is recommended :

I Year :

Abridged novels and Collections of short stories	3
Collection of biographies or plays or play	1
Total	4 books

II Year :

Original novels	2
Biography/Autobiography	1
A collection of one-act plays or a play	1
Total	4 books

3. METHODS OF TEACHING :

Extensive readers need not be read through in the class room. Teachers will have to give guidance and arouse the students' interest in the extensive reading of books. They can give a brief outline of the novel or the biography and read interesting or significant passages from the books prescribed. After the students read the books enough time must be spent on discussion of the book in the class room preferably in small groups. The examination questions on extensive readers should not demand a close, detailed study of the books and should not provide an opportunity to the students to omit any one of the prescribed books. Only short paragraph questions which do not involve detailed study should be set.

i. General Teaching Methods :

In the first year the teaching of formal language may be continued. But, at this level, the language skills should be developed more on the basis of analytic and appreciative study of whole essays or other works in prose than on that of drill with sentence forms or verbal structures. The methods of teaching and testing should be such as to give plenty of opportunity for development and use of language skills. There should be absolute discouragement of memorisation of subject matter in any form. This would involve the use of very careful testing procedures.

The teaching methods should provide students with ample opportunities to read, write and speak. Lecturing method may be used to teach students in large numbers when different aspects of the course are presented, explained, and practised. But maximum scope should be allowed for active student participation by use of dictionaries, self-correcting exercises, etc., so that teacher-domination is reduced and student-participation increased. Group Seminars should be used to give more individual attention and to provide discussion between the students, and between the teacher and the students.

ii. Scheme of Examinations :

There will be two examinations at the end of the first year and two at the end of the second year. All papers shall be of three hours' duration and shall carry a maximum of 100 marks each.

One paper to be taken at the end of the first year shall be on Twentieth Century Prose, Grammar and Composition and shall be called Paper I. The other paper to be taken at the end of the first year shall be on Poetry and Drama and shall be called Paper II.

One paper to be taken at the end of the second year shall be on Twentieth Century Prose and Composition and shall be called Paper III. The other paper to be taken at the end of the second year shall be on Poetry and Drama and shall be called Paper IV.

iii. Hours of work :

The following allotment of hours for each week for the different parts of the course is suggested.

	First year	Second year
Study of Language and Composition	1	—
Drama	2	2
Poetry	2	2
20th Century Prose	2	—
Extensive Readers	1	2
Pre-20th Century Prose	—	2
Composition Writing	2	2
Total	10	10

vi. Question Papers :

1. Paper I : (Prose, Grammar and Composition).

(*a*) Prose:	1 essay question (450-500 words)	20	Marks
	2 short answer questions on the texts	10	,,
	Sentence answer questions on to passages given from the Prose text :	10	,,
(*b*) Extensive Readers :			
	1. Five short answer questions on all the texts :	25	,,
(*c*) Language Exercises :			
	Rewriting of sentences	10	,,
	Vocabulary tests	5	,,
	Exercises in idioms and usage	5	,,
(*d*) Composition :	(*a*) Short precis	5	,,
	(*b*) Story to be developed from hints : (200 words)	10	,,
	Total	100	,,

2. Paper II : (Poetry and Drama I)

1.	One essay on either Poetry or Drama	20	Marks
2.	Two one page answers on either Drama or Poetry (i.e. from the subject other than the one on which question 1 is set)	20	,,
3.	Two short answer questions each from poetry and drama	20	,,
4.	Five sentence answer questions each on four passages quoted from the texts (2 from Poetry and 2 from Drama)	20	,,
5.	Paraphrase, expansion, explanation, commenting on italicised words and phrases, etc. on two passages each given from poetry and drama texts.	20	,,
	Total	100	,,

3. Paper III : (Prose and Composition)

1.	One short essay on the detailed text	20	Marks
2.	Two short answer questions on the texts	10	,,
3.	Sentence answer questions on two passages from the Prose Text.	10	,,
4.	Two short essays (or one-page answer) questions on the extensive readers.	20	,,
5.	Two deny or affirm type of questions or short notes.	10	,,
6.	Expansion of 2 concise statements (Proverbs etc.) into paragraphs.	10	,,
7.	One structured essay on a given general topic.	20	,,
	Total	100	,,

4. Paper IV : (Poetry and Drama II)—Same Pattern as that of Paper II.

Part III—**Optional Subjects**

B.A. Degree Examination

Group A—Subjects

SYLLABUS

Branch I—History Main

(1)

History of India—Paper I

The geographical background of Indian History—Sources of Indian History — The races of India.

The pre-historic period. The Palaeolithic, Neolithic and the Chalcolithic Ages ; The Indus Civilization ; Its nature, extent, date and general relation to *(a)* Sumerian Aryans. The Vedic period and the Early Aryan settlements—Polity and Religion. The later Vedic period Aryanisation of India—Its nature and extent.

1. The Early period : 600 B.C. to 650 A.D.

    (a) 600 B.C. to 350 B.C. Polity—Economic and Social life—Literature—Religious unrest—Rise of Jainism and Buddhism—Beginnings of Magadhan ascendancy and Tribal Republic Foreign incursions. Persian invasion and Alexander's raid.

    (b) (i) 350 B. C. to 300 A. D. The Mauryan Empire—Chandragupta, Bindusara and Asoka—Administration and Social life under the Mauryas—Decline of the Mauryas and the rise of the Sungas and the Kanvas—Literature and inscriptions. Art and Architecture.

    (ii) Foreign contacts : Indo-Greek Kingdoms—The Sakas and Pahlavas—The Kushans—Kanishka and the Saka Era—The Kshatrapas—Coins—Effects of foreign invasion on Religion and Saka culture—Gandara Art—Mahayana Buddhism. Other Religions—Vaishnavism and Saivism.

    (iii) South India : The Satavahanas—Kharavela of Kalinga—Sagam literature. The early Cholas, Pandyas and Cheras—Polity—Social life and Religion—Classical writers—Roman trade and commerce—Colonial and cultural expansion into South East Asia.

(*c*) 300 A.D. to 650 A.D.

(i) North India : The Gupta Empire. The Golden Age of the Guptas—The decline of the Guptas and the coming of the Huns—Toraman and Mihiragula. The rise of the Vardhanas—Harshavardhana—Political, religious, economic and social conditions—Chinese pilgrim travellers, Literature and Arts.

(ii) South India : Political condition of the Deccan and South India—Early Pallavas, their origin, history and contribution to South Indian culture.

2. The Mediaeval period—650 A.D. to 1525 A.D.

(*a*) 650 A.D. to 1200 A.D.

(i) North India : The Rajputs—Their origin—The main Rajput dynasties. Rajput polity and social life. Nepal, Kashmir and Assam during the period.

(ii) Deccan : The Chalukyas of Badami—The Rashtrakutas—The Chalukyas of Kalyani and Vengi—The contributions of these dynasties to South Indian literature arts and culture—Social life and religion during the period.

(iii) South India : The Great Pallavas—Their political expansion—Their administration and contribution to South Indian culture—South Indian colonial and commercial enterprise under them—The imperial Cholas—Their political history—Relations with outside powers—Chola conquests beyond the seas—The decline of the Cholas—Chola administration—Religion art and literature. Tamil expansion—The early and the later Pandyas and their exploits—The history of contemporary Cheras.

(*b*) 1200 A.D. to 1525 A.D.

(i) Northern India : The Muslim period. Rise and spread of Islam—The Arab conquest of Sindh and its effects—Ghazni and Ghori—Stages in the Muslim conquest of Northern India. Causes of Muslim success. The Sultanate of Delhi—The Slave Sultans—The Khilji Rulers—Achievements of Alauddin Khilji—The Tughlaks Muhammed Bin Tughlak's character and achievements—Firuz Tughlak—The Sayyids and

the Lodis—Fall of the Delhi Sultans Administration—Under the Delhi Sultans—Economic and social conditions—Effects of the impact of Indian and Islamic cultures on Literature, Religion, Art and Architecture—Religious movements of the 13th and 14th centuries.

(ii) The Deccan and South India :

(1) 1200 A.D. to 1335 A.D. The Yadhavas of Devagiri—The Kakatiyas of Warrangal—The Hoysalas of Dwarasamudra—Their contributions to art and literature—The later Cholas and Pandyas—Muslim conquest.

(2) 1335 A. D. to 1600 A. D.

(*a*) The Bahmini Kingdom—Sources — Government and Society — The break up of the Bahmini Kingdom and the five Sultanates of the Deccan.

(*b*) Vijayanagar Sources—Origin of the Kingdom—Rise, Growth and Decline—Relations with contemporary states—Muslim and Hindu—The battle of Talikota and after — The splendour of Vijayanagar — Administration, Economic and Social life, Art and Architecture — Religion and Literature.

LIST OF MAP QUESTION FOR BRANCH I HISTORY MAIN STUDENTS OF THE B.A. DEGREE COURSE

Indian History—Paper I

1. Ancient Civilizations — Indus Valley Civilization.
2. Later Vedic Civilization.
3. Mahajanapadas.
4. Alexander's invasion — Route in India.
5. Asoka's Empire.
6. Kanishka's Empire.
7. Gupta's Empire — Samudra Gupta's Southern expedition.

8. Harshas Empire.

9. Rajputs.

10. India in 1000 A.D.

11. Alauddin Khilji's Empire — Malik Kafoor's expedition.

12. Pallavas.

13. Chola Empire.

14. Cultural expansion into South East Asia.

15. Bahmini's Empire.

16. Vijayanagar Empire and the Deccan Sultanates.

(2)

History of India — Paper II

(*a*) The Mughals—Northern India on the eve of the Mughal conquest—Social, economic and political conditions—Babar, Humayun—Shershah Sur—His career—His political and administrative achievements. Akbar—Sources—His conquest of the Mughal Kingdom — His military achievements— Territorial expansion of the Mughal Empire—His Rajput Policy—Social and Religious reforms—The Din Ilahi — Akbar's Deccan policy — Estimate of Akbar — Jehangir and Nurjehan — Shah Jehan — Foreign Travellers and their impressions — Fratricidal conquest and the accession of Aurangazeb — Sources — his conquest — Religious policy and its consequences — Reaction against it — The opposition of the Marathas, Jats, Satnamis and the Sikhs — The Rajput wars — Aurangazeb and the Deccan — Last days of Aurangazeb.

The Administrative system under the Mughals — Military organisation—Social, economic and religious conditions—Foreign notices — Growth of Hindi and Persian — Literature, Music, Painting and Architecture.

(*b*) (i) The Rise of the Sikhs— Sikhism as a religious and political institution.

(ii) The rise of the Marathas — Sivaji — His career and achievements. Administration — Revenue and military system — the growth of the Maratha Empire from 1680-1761 — Rule of the Peshw·· — The third battle of Panipet and after.

(iii) Later Mughals — Disintegration and decline of the Mughal Empire — Causes — Rise of Hyderabad and Oudh — Invasion of Nadir Shah and Ahmed Shah Abdali culminating in the third battle of Panipet.

(iv) The break-up of Vijayanagar and the Naik Kingdoms of Madura, Tanjore and Ginji.

(*c*) The coming of the Europeans — The rise and fall of the Portuguese — The Dutch enterprise — The English East India Company — The French — The Anglo-French Tangle in India. The establishment of the English supremacy in South India. The British conquest of Bengal — Robert Clive and his settlement — Warren Hastings— His reforms. Impeachment of Warren Hastings —Charges examined. The Regulating Act of 1773 and Pitt's India Act of 1784 — Their effects on British rule in India. Cornwallis — Revenue and judicial reforms. The Charter Act of 1793 — Lord Wellesley and his subsidiary alliances — His forward policy — Lord Hastings —His policy of subordinate isolation — Reforms — Lord William Bentinck — His social and administrative legislation. The Charter Act of 1833 and its importance. Charles Metcalfe and his Press reforms —Lord Dalhousie— His character and administration — His doctrine of lapse theory of Paramountcy. Mutiny of 1857 — The Act of 1858 — The end of Company's rule.

The company's relations with Mysore, the Marathas, the Sikhs, Burma, Sind and Afghanistan.

(*d*) India under the Crown from 1858 A.D. to 1947 A.D.

(i) Influence of European politics on British Indian Administration — North-West Frontier policy — British Commercial expansion— Conquest of Burma.

(ii) The administrative policy of the Crown — its growth— Impact of Western education and thought on Indian life and Culture — Social upsurge — and economic conditions in the 19th and 20th Centuries — Birth of the Indian Nation. The Congress and the story of the struggle for freedom — The relations between the Indian States and the Crown.

(iii) Growth of representative institutions — The Minto-Morley Reforms — The effects of World war I and the Act of 1919 — Provincial autonomy — The Government of India Act, 1935. The Second world war. The attainment of Indian Independence. The establishment of the Indian Republic.

Books for Study :

1. Majumdar and Others : An advanced History of India.
2. Sathianathaier, R. : A College Text-book of Indian History 3 Volumes.
3. Nilakanta Sastri, K.A. : A History of India, 3 Parts.
4. Sathianathaier, R. : Indian History Vol. III (Tamil) (Annamalai University).

Books for Consultation :

1. Gertrude Sen : The Pageant of Indian History.
2. Basham : The Wonder that was India.
3. Ishwari Prasad : A Short History of Muslim Rule in India.
4. Roberts : British India.
5. Rawlinson, H.G. : India — A Cultural History.

INDIAN HISTORY — Paper II

List of map question for Indian History—Paper II

(Also common for the students taking this paper under Branch IV—Economics Main and Branch III(*a*) Social Sciences Main)

1. Babur's Empire.
2. Humayun's Empire.
3. Akbar's Empire.
4. Aurangazeb's Empire.
5. Sivaji's Empire.
6. European settlements.
7. Carnatic War.
8. Mysore War.
9. India at the time of Warren Hastings.
10. India at the time of Lord Wellesley.
11. India at the time of Lord Hastings.
12. India at the time of Lord Dalhousie.
13. Burmese War.
14. Afghan War and North Western Frontier Policy.
15. India on the eve of partition.
16. India in 1970.

Section I

(i) The History of Greece and Rome upto 395 A.D.

Greece

1. The Geography of Greece: Its relation to the Mediterranean and Asia Minor.

2. Pre-historic Civilization : The Aegean Civilization — The Myceansean Civilization.

3. The Homeric age : The Trojan War. Political and social conditions.

4. The City States : Origin and development— Constitutional changes from monarchy to tyranny.

5. Greek Colonization : Causes — Relations between the founding city and the colony. The areas of colonization — Results.

6. Early Greek Unity : Race and language — The Homeric poems — The Amphictionies — The Oracles — The Olympic games.

7. The Early History of Argos and Sparta : Pheidon and the Argive confederacy — The Institutions of Lycurgus — The social and economic classes — The Spartan constitution — The Peloponnesian Confederacy.

8. The History of Athens : Village communities of Attica — The four Ionic tribes and the social and economic classes — From monarchy to Democracy — Dracon — The reforms of Solon — The rise of Pisisratus — The fall of tyranny — The reforms of Clessthenes.

9. The Persian Wars : The capture of Lydia by Cyrus — Darius I The Ionic Revolt — The battle of Marathon — Xerxes and the Second Persian War — Thermophylae — Salamis — Plataea — Mycale — Causes of the failure of the Persians.

10. The Western Greeks : Tyranny in the city states of Sicily Gelon of Syracuse.

11. Growth of the Athenian Empire : Themistocles — The confederacy of Delos — Aristides — Cimon — Athens under Pericles.

12. The Peloponnesian War : The Athenian League and the Twenty Years' Peace Corinth — Alcibiades and the battle of Mantinea. The Syracusan Expedition — The failure of Athens — The triumph of oligarchy — The restoration of democracy.

13. The March of the Ten Thousand : Xenophen, Significance of the Expedition.

14. The Supremacy of Sparta : Lysander and Agesilaus — The peace of Antalcidas — Battle of Haliartus.

15. The Second Athenian Confederacy : Pelopidas and Thebes — Membership and constitution of the confederacy — Relations with Persia — Failure of the confederacy. Athens in the 4th Century B.C. Socrates, Plato, Aristotle.

16. Syracuse before and after Dionysius I : Relations with Carthage. The work of Dionysius — His successors — The battle of Crimisus.

17. The Supremacy of Thebes : Jason of Pherace — Epaminodas — Peace of Callias — The battle of Leuctra — The four Peloponnesian expeditions.

18. The Supremacy of Macedonia : Philip II — The peace of Philocrate. The battle of Chaeronea — The Congress of Corinth. Athens under Macedonia — Demosthenes.

19. Alexander and the spread of Hellenism : The conquest of Asia Minor — The conquest of Syria, Egypt, Babylonia, Persia, Media, Bactria and Sogdiana. The invasion of India — His policy of consolidation.

20. The Greece after the death of Alexander : The Hellenuistic monarchies. The Achaean and Aetolian Leagues. The conquest of Greece by Rome.

21. The Legacy of Greece : Art and Architecture — Political thought—Early Greek Science, Philosophy, Drama and Poetry.

Rome

1. The land of Italy — The peoples of Italy — The founding of Rome — The kings of Rome and the institutions of the regal period.

2. The political evolution of Rome — From monarchy to aristocracy — The Institutions of the Republic — Partician Government — The struggle between the Particians and the Plebians — The new nobility — Roman citizenship.

3. The conquest of Italy — The Latin League — The Samnite wars — Settlement of Latium — The war with Pyrrhus — consideration of Roman rule in Italy. The Roman State — Colonies — Municipia — The Military system.

4. Roman expansion in the Mediterranean—Rome and Carthage—The Punic wars—The invasion of Italy by Hannibal—Battles of Trasimene and Cannae and Zama—The West under Roman rule—Sicily, Spain—The third Punic war.

5. Rome in the East—The Achaean and Aetolian Leagues—The first and second Macedonian wars—The war with Antiochus and the settlement of Western Asia—Third Macedonian War—The settlement of Greece—Roman protectorate in Asia.

6. Rome during the Great Wars—The ascendancy of the Senate—The Roman people—Effects of territorial expansion and material prosperity. The social evolution—The reforms of the Cracchi —The Jugurthine war—Marius—The social war—Cinna.

7. The aims of Sulla—His reforms—The revival of the Senate—The rising of Spartacus—The first Consulship of Pompey—Caesar, Cicero and Catiline—Coalition of Pompey, Caesar and Crassus—Caesar's command in Gaul—Pompey's consulship—The Civil War. Caesar in Gaul — Germany and Britain — Roman advance towards the Danube — The Mirthradatic wars — The annexation of Syria.

8. The transition to Empire — Caesar and the Senate — The Civil War — Caesar in Spain — The Alexandrian War — The Dictatorship of Caesar — Caesar's rule — His reforms — Struggle for Power after Caesar's death — The Second Triumvirate — Octavius in the West — Battle of Actium.

9. The Principate — its elements — Dyarchy — The empire under Augustus — Provincial Government.

Pax Romana — The reign of Trojan — The organization of Roman Government under Hadrian — The age of the Antonines — Diocletian — Emperor worship — Theodosius — Constantine — The battle of Hadrianople 378. Division of the Empire.

Books recommended :

1. J. B. Bury : History of Greece.
2. Cary : History of Rome.
3. Grant : A History of Europe, Part I
4. Hayes and MOON : Ancient and Mediaeval History.

(ii) The History of Europe — 395 A.D. — 1500 A.D.

Europe in 395 A.D. The Roman Empire in the West, 395-476 A. D. The Invasion of Europe by the Germans — The Goths, Ostrogoths and the Visigoths. The Vandals — The Franks — Italy in the sixth century — The Eastern Empire — Justinian — Constructive forces of the Middle Ages — The Papacy ; Islam ; the Franks.

Charlemagne and the revival of the Empire. The break-up of the Carolingian Empire.

Europe in the ninth and tenth centuries — England and the Normans ; the rise of the French Monarchy ; Germany and Italy ; Feudalism.

The growth in power of the Papacy.

The struggle between the Empire and the Papacy — The fall of the Hohen-Staufens and the great Interregnum — Monasticism — Benedict of Nursia ; the Cluniac Reformation — The coming of the Friars ; the Mediaeval Universities — The Crusades.

England — The growth of National Unity, The growth of Parliament.

France and the beginnings of the greatness of the Capetian Monarcy — Philip Augustus — St. Louis.

The Hundred Years War.

The Papacy and Philip IV of France. The Babylonish Captivity.

The growth of Mediaeval cities.

Germany and Italy in the 14th and 15th centuries.

The Rise of the Swiss Republic.

The Rise of Nation States — England ; France ; Spain.

The Byzantine Empire and the Ottoman Turks.

The Renaissance and the end of the Middle ages.

Books recommended :

Grant : A History of Europe.

Carl Stephenson : Mediaeval History.

Hayes and Moon : Ancient and Mediaeval History.

M. Arokiaswamy : European History (Tamil) (Amudha Nilayam Private Ltd., Madras).

(iii) History of Islam — Paper I

(From Ancient Times to 1258 A.D.)

Geographical features of Arabia. Its physical divisions. Its climate. Its deserts. Its oases. Valleys that serve as trade route. Inhabitants. Their racial affiliation and classification. The Ancient Arabs — The 'Ad and Thamud.

Ancient Arabian Kingdoms. The Mineans, Sabaeans and Himyarites. Their civilization. Architecture. Sources of Information. Inscription — The Dam of Marib. The Abyssinians.

The Religion of Ancient Arabia : The Cult of the Moon; Planetary worship. Advent of Christianity — Spred of Judaism — Rivalries

Petty N. Arabian states.

The Nabataeans. The Kingdom of Balmyrena. The Kingdom of Ghassan. The influence of Rome. Buffer State. Kingdom of Hira. Persian political influence. Numan bin Mundhir's Court. Its splendour and greatness.

Al Hijaz. Significance of the Jahiliyya. The supremacy of the Quaraysh. Growth of the City State of Makkah. The constitution, Economic Life.

The religion of the Arabs of the Jahiliyya period — Their beliefs and practices. Their virtues — al Muruwwah. Their vices. Absence of national unity. The rivalries between North Arabians and South Arabians. Condition of Persian and Byzantine Empires. Advent of Islam.

Teachings of the Prophet. His life and his reforms. Establishment of human brotherhood. Attitude towards other faiths. The Quran. The Traditions. An estimate of his achievements.

Early Caliphate.

The elective principle. Functions of the Caliph ; Inaugural address. Abu Baker and Umar. Contacts with the Romans and the Persians. Speedy victories of the Arabs ; Their causes. The Dhimmis-Expansion of Islam in Egypt, Syria and Persia. Political and administrative machinery set up by Umar I, Separation of Judiciary and executive. System of taxation. The Agrarian reforms of Caliph Umar. Uthman and Ali. Schisms in Islam. Shias and the Kharijites. Settlements of Kufah and Basrah. Centres of learning.

The Umayyads.

The change over from the elective to hereditary system of succession. Transformation of the Caliphate into Kingship. Its consequences Karbala. Its political and religious effects. Dominance of the Arab race. Administration. Departments of State. Reforms of Amir Muawiya and Abdul Malik. The Umayyad court life. Division of Society. Adoption of foreign custom. The Harem system. Position of Women in Society. Syedah Sukaina. Walid I. Conquests of Spain and Sindh. His Interest in Architecture and Social amenities. Reforms of Umar II. Growth of learning. The Science of Tradition. The later Umayyads. The causes of the downfall of the Umayyads. The rise of Muhammad al Imam. The resurgence of the Persians — Abu Muslim al-Khurasani.

The change over to the Abbasides. Umayyads in Spain. Mansur, the great Abbasid. Bagdad. The influence of the Persians. The Barmakid dynasty of Wazirs. Sacremental character of the Caliphate. The departments of the State. The Shu'ubiyah Movement — Emergence of Persian nationalism. Age of translations. The Baitul Hikmat. Harun al Rashid and Mamum. Intellectual awakening. Arabs as leaders of thought, Medicine, Travelling clinics, Medical libraries. Astronomy and Mathematics. Arab Numerals, Geography. Historiography. General level of culture.

The later Abbasides.

The Abbasid Empire not co-extensive with Islam. Rise of independent states in the East and the West. The Buwyhids and the Saliuq Sultans. The Crusades. The Fatimids of Egypt. Their cultural activities. Al Azhar University of Cairo. Al Hakim the great Fatimid. His observator at Al Muqattam in Egypt. The rise of the Assassins. Hassan bin Sabbah, Nizamul Mulk, the Saljuq Wazir. His academy at Bagdad. Political upheavels. The causes of the downfall of Abbasids. The factions at Bagdad. Luxury and laxity of morals. Hulaku Khan. Fall of Bagdad, 1258 (656 A.H.).

Books recommended :

1. Amir Ali : Short History of the Saracens.
2. Hitti : History of the Arabs.
3. Salik : Early Heroes of Islam.
4. Muir : Caliphate.
5. Lane-Poole : Moors in Spain.
6. Hell : Arab Civilization.

Section II

(i) History of America since 1776 A.D.

1. Latin America. Struggle for Independence — The Wars of Revolution, 1810-1824 — Battle of Ayacuchae — The great Liberators — Course of Self-Government in Latin America in the 10 republics and the three colonies — The relations of Latin American States :

(*a*) among themselves,

(*b*) with the United States and

(*c*) with other countries down to the end of World War II— The period after World War II.

2. North America — United States.

(*a*) History between 1763 and 1788 — American Revolution — Declaration of Independence — The Constitutional Convention.

(*b*) History between 1778 and 1914 :

(i) The United States (1789 to 1861) First Congress at New York — Economic Developments — Political Parties — The Louisiana Purchase — War of 1812 and the Treaty of Ghent — The Munroe Doctrine — Territorial expansion — The Origin Trail — The annexation of Texas — War with Mexico — The acquisition of California — Slavery — The Compromise of 1850 — Abraham Lincoln as the 16th President.

(ii) The Civil War (1861 to 1865) — Political and Social Aspects of the War Period.

(iii) The United States (1865 to 1914) Assassination of Lincoln — 14th Amendment — The Basic Reconstruction Act — The Sherman Anti-Trust Law — The Spanish American War — Treaty of Peace signed at Paris — The Federal Reserve Bank Act — Woodrow Wilson and the Foreign Policy of the United States — U. S. Declaration of War on Germany.

(c) British North America :

(i) Passage of the Canada Act — Exploration of the West — War between Great Britain and United States — Rebellion in Upper and Lower Canada — Durham's Report — The Union Act — British North America Act — Purchase of North-West Territories from the Old Hudson Bay Company — Red River Rebellion.

(ii) New Foundland — Grant of Responsible Government — Bait Act — Bank failure and insolvency — Financial depression — Sir Robert Bond and Sir Edward P. Morris.

(d) Alaska — Early Explorations — Vitus Baring — Thomas Cook — The Russian — American Fur Company — The United States purchase of Alaska — Settlement of the Boundary Dispute — Alaska given territorial status.

History after 1914 :

(i) The United States — war declared on Germany — Treaty of Versailles — Washington Conference — Stock Market Crash — Clark Memorandum on the Munroe Doctrine — Franklin D. Roosevelt and the New Deal — Agriculture, Banking, Home financing, Relief, Securities, Labour Legislation — Foreign policies of the New Deal — The United States and the Second World War.

(ii) The Dominion of Canada — Canada between the two World Wars — Canada during World War II.

(iii) New Foundland — Loses its status as a domination — The Royal Commission and its recommendations — Union with Canada.

Books recommended :

1. Robertson : History of Latin American Nations.

2. Nevins and Commager : A Short History of the United States.

3. Andre Maurois : A New History of the United States.

4. Grahm : Canada.

(ii) Modern Asian History (From 1850 A.D. to the Present day)

1. History of the Near East and Middle East

(*a*) The Ottoman Empire and Turkey in Asia, 1876-1914 : Abdul Hamid II — Constitution of 1876 — Aremenian Revolutionary movement — The rise and growth of the Young Turk movement — Revolt of First Army Corps — Mohammed V's Constitutional Revision, 1909 — Proclamation of the Republic — Kemmal Ata Turk.

(*b*) Persia : Russian conquest of Merv. Sixty year oil concession to W. K. D'Arch I The Anglo-Russian entente, 1907 — Persia since Reza Shah Pahalavi.

(*c*) Afghanistan, 1850-76 : Second Afghan War ; Abdul Rahman ; The Penjdeh Incident ; The Durant Agreement ; Habibullah Khan, 1907. Anglo-Russian entente and Afghanistan — Aminullah — Afghanistan since 1929.

(*d*) Middle East and World War I ; The Mesopotamian Campaign, 1914-1916. The Sykes — Picot Agreement — Arab Revolt in the Hejas — Proclamation of Hejas — The collapse of Turkey — The rise of Hejas as an independent power — French Mandate over Syria — British Mandate over Mesopotamia and Palestine. Syria since 1918 — Palestine and Trans-Jordania since 1916 — Saudi Arabia, Yemen and Iraq and the Hashmite Dynasty since 1919.

2. History of the Far East

(*a*) Japan 1868-1912 — The Meji period — The constitution of 1898 — The Sino-Japanese War, 1902 — Anglo-Japanese alliance, 1904 - 1905. The Russo - Japanese War — The Thiso period, 1912-1926 — Japan during World War I. The Shona period — Japan and World War II — Japan since allied occupation.

(*b*) Sïnce 1850. The growth of diplomatic intercourse with the West. The Sino-Japanese War over Korea. The Far-Eastern Triplis, 1896 — Treaty of Alliance between Russia and China — The threatened partition of China — The Boxer outbreak 1900 — China under Yuan Shiki, 1912 — The beginning of the Republic of China — China during World War. The unification of China under Kuommintang — New China since Mao-Tse-Tung.

(c) The lesser lands of Asia since 1850 — Tibet — Sinkiang — Mangolia — Korea — Eastern — Siberia — Indo-China — Siam — Burma — Ceylon — The Malay Peninsula — The East Indies and Philippines.

Books recommended :

Kroger : Kemalist Turkey and the Middle East.

Foster : The Making of Modern Iraq.

Brocklemann : History of Islamic Peoples.

Heath : The World in the Twentieth Century, Part VI, Chapters 24, 45 and 46.

Vinacke : A History of the Far-East in Modern times.

Van Mook : The States of Democracy in South-East Asia.

Owen and Eleanor Lattimoore : The Making of Modern China.

Porter : The Rise of Japan, the Rise of a Modern Power.

(8)

(iii) History of Europe From 1500 A.D. to the present day

Introduction — Europe at the close of the middle ages.

Renaissance — Voyages of Discovery — Rise of national monarchies — France, England, Spain and Portugal.

France under Louis XI — Ferdinand and Isabella of Spain — Charles VIII's invasion of Italy — Franco — Spanish Rivalry — The Italian Wars — Emperor Charles V.

The Reformation — Charles V and Germany Luther and Calvin — The Counter-Reformation — Philip II of Spain — His work in Spain — The Battle of Lepanto — The Dutch war of Independence — French Religious wars — Philip II and England — The Armada — Decline of Spain.

France under Henry IV — Richelieu — Mazarin — The Thirty Year's war — Treaties of Westphalia and the Pyrenes — Louis XIV — His policy and Government. His foreign policy — War of the Spanish Succession — Peace of Utrecht.

Rise and decline of Sweden — Gustavus Adolphus — Charles XII — Rise of Russia — Peter the Great — His character and policy — Baltic wars — Treaty of Nystadt — Turkey Siege of — Vienna Sobieski of Poland — Catherine the Great — Partition of Poland — Russia's Wars with Turkey — Treatise of Kutchuk — Kainardji and Carlowitz — Decline of Turkey.

Rise of Prussia — The ' Great Elector '—Frederic the Great — Maria Theresa — War of the Austrian Succession — The Diplomatic Revolution — The Seven Year's War — Anglo-French Colonial Rivalry.

Age of the ' Enlightened Despots ' — Joseph II.

France under Louis XV — Louis XVI — The French Revolution — Its course and results — French Revolutionary Wars—Napoleon — His work in France, Napoleonic War — Fall of Napoleon — Congress of Vienna — The Holy Alliance — Metternich.

Liberalism and Nationalism — War of Greek Independence — Liberation of South America — Munroe Doctrine — Revolution of 1830 — Revolution of 1848 — Second Empire in France — Unification of Italy — Unification of Germany — Policy of Bismark — Austro - Prussian War — Franco - Russian War — The German Empire — Third Republic in France.

The Eastern Question — The Crimean War — The Russo-Turkish War — Congress of Berlin — The Balkan States — Young Turks — Balcan Wars, 1912-1913.

Germany between 1870 and 1914 — The Triple Alliance — Britain and Germany — Russo-Japanese War — The Triple Entente Pan-Slavism — German influence in Turkey — Armed Peace — Austria-Hungary under Francis Joseph — Sarejevo — First World War — Course and results — Peace Treaties of Versailles and Laussanne — League of Nations — Its work and failure — Locarno Pact.

Facism in Italy — Nazism in Germany — Other Dictators — Kemal Pasha — Japanese aggression on China — Rise of the Axis — Munich — Second World War — Its course and results — U. N. O.

Books for Study :

Grant : History of Europe — Parts 3 and 4 (Latest Edition).

Hayes : Political and Social History of Europe, 1936.

Books for Consultation :

Seignobos — The Rise of European Civilization, 1944.

Grant and Temperley : Europe in the 19th and 20th Centuries, Sixth edition, 1952.

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Section III

(i) History of Islam after 1258 A.D.

Paper II

Minor Dynasties after 1258. Kingdom of Granada. Almohavids of North Africa. Arabs in Sicily. Norman — Arab kings. Mamlukes of Egypt — Hamdanids of Syria — Persia under the Safavids.

The Ottoman Empire — Sulaiman the Magnificent Turks in Europe. Causes and results of European Renaissance — Abolition of the Caliphate in 1924. Its causes and effects. The Turkish Republic and the rise of Modern National Muslim States : Morocco, Egypt, Syria, Arabia, Iraq, Mandatory powers. The resurgence of Israil. The Arab League.

Books Recommended :

1. Brocklemann : History of Islamic Peoples.
2. P. K. Hitti : History of Syria.
3. Everleigh : Ottoman Empire (abridged).
4. Sykes : History of Persia.
5. Lane-Poole : Muhammadan Dynasties.

Books for Consultation (for both Papers) :

1. Amir Ali : Spirit of Islam.
2. Lane-Poole : Saladin.
3. Lavy : Sociology of Islam — 2 volumes.
4. J. Zaidan : Ummayyads and Abbasids.
5. T. W. Arnold : The Legacy of Islam.
6. Gibb : Islam and the West.

(ii) Political and Constitutional History of England Upto 1603 A.D.

Political :

Pre-Norman Period — Roman-Britain — Anglo-Saxon Conquest Heptarchy — Conversion of the English — West Saxon Supremacy — Danish Conquest.

Norman Conquest — Norman Kings upto Stephen — Relations with the Barons — Relations with the Church.

Constitutional :

Features of the British Constitution — Anglo-Saxon Polity — Constitutional importance of the Norman Conquest — Growth of Feudalism — Norman Monarchy and its strength — Reforms of Henry I.

Political :

The Plantagenet Period — Henry II's Empire — His quarrel with Becket — John — His quarrel with the Pope and the Barons — Henry III Barons wars — Simon de Montfort.

Constitutional :

Reforms of Henry II — Magna Carta and its importance — Baronial opposition under Henry III — Provisions of Oxford.

Political :

Edward I — Conquest of Wales — Wars with Scotland — Edward II — Bannockburn — Mediaeval Culture — The Church — The Monasteries — The Friars — Universities — The Mediaeval City and Guild — The Mediaeval manor.

Constitutional :

Laws of Edward I — Origin and Development of Parliament — "Model" Parliament — Confirmation Cartarlum — Edward II — The Lords Ordainers Revolution of 1327.

Political :

Edward III — The Hundred Years' War — Richard II — Peasant's Revolt — Economic and Social Changes — Wycliffe and the Lollard Movement. Deposition of Richard II — The Lancast-rians — Renewal of the Hundred Year's war — End of the war and its results — Wars of the Roses — The Yorkists.

Constitutional :

Development of Parliament under Edward III — The "Good" Parliament — Impeachment — Richard II's attempt to set up despotism — Lords Appellants — Revolution of 1399 — The Lancastrian monarchy — Parliament under the Lancastrians — Breakdown of Government and its causes — Strong monarchy of the Yorkists.

Political :

The Renaissance — Voyages of discovery — Henry VII — His commercial and foreign policy — Henry VII — Wolsey — Thomas Cromwell — The Reformation — Edward VI — Catholic reaction under Mary — Elizabethan Church Settlement — Importance of the reign of Elizabeth — Her foreign policy — Marry Queen of Scots — Elizabethan Seamen — The Armada — Conquest of Ireland — Social and Economic conditions — Trading Companies Poor Law — Literature.

Constitutional :

Tudor dictatorship — The Council — Star Chamber and other courts — Tudors and Parliament — Privileges of Parliament — Constitutional results of the Reformation — Local Government — The Justices of the Peace.

Books for Study :

Keith Feiling : History of England.

Adams : Constitutional History of England (Rev. Ed., 1935).

A. Suriyanarayanan : Political and Constitutional History of England from 1603 A.D. (Tamil).

Books for Consultation :

Trevelyan : History of England (2nd Ed., 1938).

Tasswell-Langmead : English Constitutional History (10th Ed., 1947).

(iii) Political and Constitutional History of England from 1503 A.D. to the Present Day

Political :

Introduction : England at the end of the Tudor Period.

The Stuart Period — James I — His character — His religious and foreign policy — Charles I — His character — His Government — The Civil War — Its results.

Constitutional :

Relations between James I and Parliament — Revival of Impeachment — Clash between Charles I and Parliament — The petition of Right — The Eleven Years' Tyranny — The Long Parliament and its work — Revolution of 1649 — The Commonwealth — Its constitutional experiments.

Political :

Oliver Cromwell's character and internal policy — His foreign policy — End of the Commonwealth — The Restoration — The Clarendon Code — Wars with Holland — James II — His character and religious policy — Monmouth's rebellion — Revolution of 1688 — Colonial and Commercial expansion under the Stuarts.

Constitutional :

Character of the Restoration — Charles II's Declaration of Indulgence — Test Act Habeas Corpus Act — Exclusion Bill — Whigs and Tories — James II's declaration of Indulgence — His use of the Dispensing power — The Seven Bishop's case — Nature and results of the Revolution of 1688 — Bill of Rights — Act of Settlement.

Political :

William III's foreign policy — War of the English Succession — National Debt and the Bank of England — Anne — Union with Scotland — War of the Spanish Succession — Literature — Accession of George I — The Fifteen — Walpole's domestic and foreign policy — George II — The war of the Austrian Succession — The Forty five — The Seven Years' War — Policy of Pitt the Elder.

Constitutional :

Growth of party system and Cabinet Government — Importance of Walpole's Ministry — The Whig Oliarchy — George III — His character and policy — Fall of the Whigs — Lord North — Wilkes.

Political :

War of the American Independence — Policy of Pitt the Younger — Act of Union with Ireland — Industrial and Agrarian Revolutions — Humanitarian Movement — Wesley — and the Methodists — The French Revolution and its influence on Britain — Nelson — Trafalgar — Wellington — Peninsular War — Waterloo — Congress of Vienna — Howard and Jail Reform — Wilberforce and abolition of Slavery.

Constitutional :

George IV and William IV — Substitution of influence for power — Victoria and the Cabinet — Movement for Parliamentary Reform — Reform Acts of 1832, 1867 and 1884-1885 — Representation of the People's Acts of 1918 and 1928 — Relations between the House of Commons and House of Lords — Parliament Act of 1911 — Subsequent changes — Reorganisation of the Judiciary — Reform of Local Government.

Political :

Victorian Age, Problems of Industry — Factory Acts — Trade Developments — Protection versus Free Trade — Religion — Literature — Science — Growth of Canada and Australia — Transfer of India to the Crown — Boer War — Imperialism — Relations with Russia — Crimean War — Gladstone and Disraeli — Chamberlian and Tariff Reform — Edward VII — Anglo-French Entente — The Triple Alliance and the Triple Entente — The Irish Question — Home Rule Bill 1911-1914 — The First World War — Britain's Part in the war — Lloyd George — Russian Revolution — Wilson and American Intervention — Collapse of Germany — Peace Treaties — Effects of the War — League of Nations — Dictatorship in Europe — Events leading to the Second World War — —The Second World War and Britain's part in it—Churchill — Roosevelt and American intervention — Defeat of Italy and Germany — Effects of the War — U.N.O.

Constitutional :

Constitutional results of the two world wars — war cabinet — Relations between the Dominions and Britain — The Irish Free State. Statute of Westminster — Irish Republic — Abdication of Edward VIII — Beverigde Report and Social Security — The Civil Service — Development of Public Rights — Religious freedom — Rule of Law and its limitations.

Books for Study :

Keth Feiling : History of England.

Adams : Constitutional History of England
(Rev. Ed., 1935)

Books for Consultation :

Trevelyan : History of England (2nd Ed., 1938).

Tasswell Langmead : English Constitutional History
(10th Ed., 1947)

(12)

Branch II—Political Science Main

Group A

Political Theory (Including A Text) :

Political science — Its scope and methods — Relations between Politics and other Social Sciences.

Chief elements and characteristics of the State — Its relation to Nation, Society, Government.

Theories of the origin of the State, speculative and historical.

Sovereignty de jure and de facto and its location in the State considered in relation to various types of existing constitutions. The pluralistic view of Sovereignty.

The end of the State, Individualist collectivist and liberal democratic views of the purpose of the State.

Law, its nature, sources and sanctions — Law and Morality.

Liberty. Civil Liberty. Rights and duties of citizenship. Safeguards of liberty. Law and Liberty.

Equality. Legal, Political, Economic and Social Equality in the modern State.

Forms of Government. Democracy as a form of Government, as an order of Society, as an Industrial condition and as a moral and spiritual principle. The nature of public opinion. Dictatorship, personal and party.

Unitary and Federal States. Federation and Confederation. Conditions of Federalism.

The Constitution, its essential ingredients. Classification of Constitutions. Constitutional amendment. Political conventions, their use and value.

The theory of the Separation of Powers and the extent of its application to modern constitutions.

Prescribed Text : One of the following :

1. Machiavelli : The Prince Tr. by Ricci (World's Classics).
2. Locke : Second Treatise on Civil Government.
3. Burke : Reflections on the French Revolution.
4. Mill, J. S. : Representative Government.
5. Selections from Aquinas — Text-books as in Blackwell's Political texts Aquinas.
6. Selections from the Arthasastra — Books I, VI, VII, VIII and XII (Shamasastry).
7. Selections from the Kural — Porutpal.

Books Recommended :

Soltau : Introduction to Politics.

Lord : Principles of Politics.

Strong : Modern Political Constitutions.

The Evolution of Government

Earliest human governments. The empires of Egypt. Mesopotamia and China. The organization of ancient bureaucracies.

Tribal Polity. Indo-European tribal organization in the West and the East.

The City-States of Greece and Rome. The evolution of Government in Greece and nations of cyclical change. Colonial and imperial government.

Barbarian monarchies in Europe. The influence of the organization of the Church. Development of administrative organization in Carolingian and Anglo-Norman Governments.

Indian polity — ancient and mediaeval — Kingship — The concept of Dharma — The administration — Mauryan and Gupta Governments — Government in South India — The Chola Administrative system.

The pluralist society of the Middle Ages in Europe. Feudalism and the supremacy of law. The Estates — Mediaeval constitutionalism and representative assemblies in Spain, France, England and Scotland. Mediaeval cities — Italy, France and the Hansa towns.

Rise of the modern nation state in sixteenth century — Europe — Consolidation of nations — Absolute monarchies.

The French Revolution and the spread of the principles of nationality and regalitarian democracy. Church and State after the Reformation.

The Liberal Democratic State of the nineteenth century. Collectivist and totalitarian states in Europe between World War I and World War II.

Federalism — Ancient federal unions — the Netherlands — Switzerland — the U.S.A. — Federalism in the Commonwealth. Latin American Federations.

International organization — The Pax Romana, the Mediaeval unity of Europe, Indian conception of Suzeranity and mandalas — Post Reformation efforts at European Unity — The League of Nations — The United Nations.

The Contemporary State — Democratic Centralism — People's Democracy — The Welfare State.

Books Recommended :

Sidwick : Development of European Polity.

Altekar : State and Government in Ancient India.

Schuman : World Politics.

(14)

Modern Governments

Constitutions, written and unwritten —conventions and usages — federal and unitary constitutions — separation of powers — rule of law and administrative law — constitutional amendment.

The constitutions of India, the United Kingdom, Eire, the U.S.A., Canada, France, Switzerland, the U.S.S.R., Japan and Australia will be studied in detail with reference to :

1. The mode of amendment.
2. The guaranteed rights of the citizen.
3. The Expressed and/or implicit social ideas of the Constitution.
4. The distribution of power between the Centre and the Units.
5. The composition and functions of the formal and real executives.
6. The organization and powers of the Legislatures, Central and Local.
7. The procedures and methods of business of the legislatures.
8. The franchise and the electoral system.
9. Political parties.
10. The Administration and the Public Services including methods of recruitment and control.

11. The structure and duties of the Judiciary.

12. The role of minorities, interest and pressure groups.

Books Recommended :

Carter : Ranney and Herz : Major Foreign Powers.

Ghosh : The Government of the Swiss Republic.

Marx (Ed) : Modern Foreign Governments.

Gledhill : The Constitution of the Republic of India.

Ogg and Ray : Introduction to American Government.

Brogan : The U.S.A.

M. V. Pylee : The Indian Constitution at work (Asia Publishing House).

(15)

Elements of Public Administration

1. The scope and nature of Public Administration — Relation of the administration to the legislature, the executive and the judiciary — Municipal administration in town and city.

2. Organization of departments — Powers and liabilities of administrative officials — Organization for different Governmental functions — Line, staff and auxiliary services — Relations within a department and between departments — Office Procedure — Administration of finances and records — Accounts and audit.

3. Public personal administration — History of the civil service — Personnel Agencies and Civil Service Commissions — Recruitment examination and promotion — Service rating — Discipline and employed organization — Compensation and retirement.

4. Government planning and research — Development of plans and programmes in war and peace — Publicity and Public relations — The Administrative organization in India.

Books Recommended :

1. White : Introduction to the Study of Public Administration.

2. Morstein Marx (Ed) : Elements of Public Administration.

3. Gladden : Public Administration.

4. Rathnaswamy : Public Administration.

5. Joshi : Indian Administration.

6. P. Natarajan : Pother-thurai Atchi (Public Administration) (Tamil).

(16)

State and Government in Ancient India

1. The works on Dharma Sastra and polity as sources of our knowledge.

2. Literary and epigraphical sources of our knowledge of Government in ancient India.

3. Indian theories of the origin and function of the State.

4. Legal and social status, rights and duties of individuals and classes.

5. Indian social organization as a pattern of pluralism.

6. Limits of royal authority.

7. Kingship in theory and practice.

8. The role of the administration : The organization of the executive.

9. Deliberative Assemblies, Central, Local and professional.

10. Guilds and Corporate authorities.

11. Civil Administrative Organization. Evolution from age to age.

12. Military Organization.

13. Financial Organization.

14. Regional and District Government : The role of local bodies.

15. The Administration of Justice.

16. Centralism and Bureaucracy.

Books Recommended :

1. Beni Prasad : The State in ancient India.

2. Altekar : State and Government in Ancient India.

3. Dikshitar : Administrative Institutions of Hindu.

4. Mahalingam : South Indian Policy.

5. Iyengar, S.K. : Evolution of Administrative Institution in South India.

(17)

International Relations and Diplomacy

1. The State and the State system. Evolution of sovereign states in Europe and Asia — Balance of power.

2. Nationalism and Sovereignty. Growth of nationalism in Europe in the 19th and in Asia in the 20th centuries, Political autonomy and national self-sufficiency.

3. Foreign affairs and the concept of National security. The mechanism of management of foreign affairs. Diplomacy as instrument of national policy.

4. War as instrument of national policy. Economic organization as part of national policy.

5. Management of inter-state relations — Diplomatic negotiations — Collective Security — Conferences — Permanent organizations of consultation — Open and Secret Diplomacy.

6. History of international relations 1900-1945 — World War I. The Versailles settlement. Economic and political re-adjustments of the inter-war period. The expansion of international relations to cover the entire world — European and Asian politics leading to World War II — Regionalism, Internationalism and Nationalism after World War II.

7. From the League of Nations to the U.N. Forces making for international government and forces operating against it.

8. The foreign policies during and after World War II of the United Kingdom, the U.S.S.R., the U.S.A., France, Germany, Japan and China.

9. Regionalism in Asia and Africa—Indian foreign policy since 1947.

10. The problems of world community — Political, economic and social. The U.N. and its Agencies.

Books Recommended :

Schuman : World Politics.

Gathorne Hardy : History of International Relations.

Palmer and Perkins : International Relations.

Nicolson : The Evolution of Diplomatic Method.

(18)

Constitutional and Administrative history of Modern India (From 1600 A.D.)

The system of government and administration prevailing in India when the East India Company obtained the Diwani of Bengal. Development of English government in the Presidencies. The Government of the East India Company — The Regulating Act. The Charter Acts. Transfer of power to the Crown.

India under the British Crown — Development of the administration and the beginning of decentralisation. Local Self-Government. The evolution of legislature till 1909. The Minto-Morley constitution. The montagu-chelmsford Report and Dyarchy. Provincial autonomy and the Government of India Act, 1935. The Government of Indian States : the administrative and political implications of Paramountcy. Political agitation from 1857 to 1947. The Indian Independence Act, 1947. The New Constitution. The structure of government at the centre and in the states. The Departments of Government at Delhi and Madras. Their organization and functions. The composition and working of the legislatures. Political parties and their organization. Cabinet government in India. Planning and the problems of administration. Constitutional change-formal amendment and development of conventions.

N.B.—Illustrative documents to be prescribed.

Books Recommended :

Illbert : Government of India.

Muir : The Making of British India.

Keith : Constitutional History of India.

Palande : The Indian Constitution.

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Branch III (*a*)—Social Sciences Main

(Syllabi)

Sociology—Paper I

Scope of Sociology—relation to other social sciences such as Anthropology, Psychology and History. Elements of structure. Meaning of "Social Structure". Social order and Social change. Analysis and classification of social groups. Social controls — Law custom, morals and religion. Private property—its development from the earlier times. Class and status. Ethnocentrism.

Books :

Lapierre	:	Sociology
Forde	:	Habitat, Economy and Society
Kroeber	:	Anthropology
Lewie	:	Social Organisation
Firth	:	Human Types
R. Brown	:	Structure and Functions in Primitive Society
Murdock	:	Social Structure
Nadel	:	Foundations of Social Anthropology
Lowie	:	Cultural Anthropology.

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Sociology—Paper II

The Indian Castes and Tribes — Their economy, sociology and religious beliefs, understood against the background of general culture — history — distribution, geography — environment, linguistic affinities.

Trial Structure :

Contacts with civilization and their effects.

Ethnocentrism in the contact between Highlanders and plains people.

Village communities in India.

Tribal rehabilitation.

Economic life of tribes in South India.

Books :

Aiyappan	:	Iravesand Culture Change
Altekar	:	Village Communities in Western India.
Hutton	:	Caste in India.
Ehrenfels	:	Kidar of Cochin.
Ghurye	:	Caste and Class in India.
Majumdar	:	Fortunes of Primitive Tribes.

Provisional Re-arranged Syllabus

Principles of Sociology — Paper I

Syllabus	*Reference*
Scope of Sociology :	
Definition (subject matter)	Davis — Human Society
Need for study Values	Gillin and Gillin — Cultural Sociology. Merrill and Eldredge — Culture and Society. Timasheff and Facey — Sociology.
Sociology as a Science :	
Methods	Green — Sociology Bierstedt — The Social Order. Bottomore — Sociology.
Relationship of Sociology to other Social Sciences :	
Anthropology, Psychology, History	Ross — Basic Sociology Bottomore — Sociology Timasheff and Facey — Sociology Bierstedt — The Social Order.
Economics, Politics and Ethics	Majumdar and Madan — Social Anthropology.

Syllabus	Reference
Social Structure :	
(General Idea)	Bottomore Sociology Anderson and Parker Society Firth — Human types.
Social Groups :	
Analysis and classification	Bogardus — Sociology (Chapter I) Bierstedt — The Social Order (Chapter X)
Functions of Groups	Green — Sociology (Chapter III)
Relation between Individual and Society :	
Heredity *vs* Environment (General Idea)	Maciver and Page — Society
Social Processes :	
(i) Associative processes	Gillin & Gillin — Cultural Sociology.
Accommodation Assimilation Acculturation	(Part V—Dynamics of Social Organisation)
(ii) Dissociative processes Conflit Competition Contravention	Ogburn & Nimkoff Handbook of Sociology (Chapter VI)
Social Institutions :	
Nature and functions —	Ross — Basic Sociology
Theories of origin, forms and Changes.	
(i) Family	Green — Sociology
(ii) Economic (including Private Property)	
(iii) State — Political	Firth Human Types
(iv) Religious	Ogburn & Nimkoff — Handbook of Sociology
(v) Other Social Institution.	Bottomore — Sociology

Syllabus	*Reference*
Social Control :	
Meaning and Methods	Roucek — Social Control
Agencies of Control	Bottomore — Sociology
Law, Custom, Morality,	Green — Sociology.
Religion, Education.	
Social Order :	
(General Idea)	Ogburn & Nimkoff — Handbook of Sociology.
Social Change :	
What is change — Why study Change — Factors of Change Sociology. ship — Patterns	Maciver and Page — Society their interrelation — Green — Bottomore — Sociology
Social change as progress and Evolution —	
Example of Social change :	
Social Movements (Single topic)	Bierstedt — The Social Order.
Social Stratification :	
Class	Davis — Human Society Ogburn & Nimkoff — Hand-Book of Sociology.
Caste	Anderson & Parker—Society Bottomore — Sociology Bierstedt — The Social Order
Estate	Green — Sociology.
Ethnocentrism :	
(General Idea)	La Pierre & Farnsworth — Sociology Bierstedt — The Social Order : Chapter VI—No. 14 Green—Chapter III—Sociology.
Student's Text Book :	Fundamentals of Sociology by Gisbert.

Provisional Re-arranged Syllabus

Sociology (Indian)

Paper II

Syllabus	*Reference*
I. Indian Tribes :	
1. General Picture of Indian Tribes	Krishna Iyer and Bala Ratnam
2. Geographical Distribution and its effects	Anthropology in India.
3. Language — its effects	Majumdar — Races and Culture of India.
4. Social Organisation of Indian Tribes	Publications Division— Social Welfare in India.
5. Economic life of Indian Tribes with special emphasis of South Indian Tribes.	Publications Division
6. Religious Beliefs	The Advised.
7. Social Control of Indian Tribes	Elwin — The Aboriginals.
8. Intensive study of tribe	Elwin — India's North-East Frontier.
" Todas " tribe	Ehrenfels — Kadars of Cochin.
	Elwin — Bondo Highlanders.
9. Tribes.	
10. Contacts with civilization and their effects	
11. Enthrocentrism in the contact between Highlanders and Plains people	
12. Tribal Rehabilitation.	

Magazine references for three Sections : Social Action Yojana, Social Welfare, Students Text Books, Social Anthropology by Majumdar and Madan.

II. Social Stratification in India :

Groups : Religious, Social and Occupational Distinctions between tribes and caste.

Syllabus	*Reference*
1. Features of caste	Hutton — Caste in India.
2. Functions	Ghurye — Caste, Class & Occupation.
3. Theories of Origin	Srinivas — Caste in Modern India.
4. Historical Development	
5. Caste in India of today	Majumdar — Races and Culture of India.
6. Future of caste	Majumdar & Madan — Social Anthropology.
7. Untouchability — Its Historical Background—Legislation — past & present	Publications Division — Social Welfare in India.
8. Backward classes	
9. Caste v.s. Class	Aiyappan — The nayadia.

III. Village Communities in India :

1. Importance of Village Community Studies	Desai — Rural Society in India.
2. General characteristics of Village Communities — ancient and modern	Majumdar — Rural Profiles. Srinivas — Caste in Modern India.
3. Village Unity	Dube — India's Villages.
4. Village Government — Panchayat and Council	Madan — Changing Pattern of Indian Villages.
5. Village Democracy	Brayne — Better Villages.
6. Village Economy	Marriot — Village India.

Syllabus	*Reference*
7. Social Organisation of Village Communities	Turner(ed) — India's Urban Future.
8. Differences between Rural and Urban Areas	Publication Division — Social Welfare in India.
9. Effects of Industrialization and urbanization on Rural Areas	Maciver and Page — Society.
10. Rural Problems	
11. Village Uplift Movements :	
(*a*) Rural Reconstruction	
(*b*) Community Development	
(*c*) Co-operative Movements	
12. Examples of Villages Communities in various parts of India.	

History of India—Paper II

(Syllabus same as for Branch I — History Main Vide Syllabus No. 2).

History of Greece and Rome upto 395 A.D.

(Syllabus same as for Branch I — History Main Vide Syllabus No. 3).

Ethics

(Syllabus same as for Branch VI — Philosophy Main — Vide Syllabus No. 41).

Philosophy of Religion

Introduction :

1. Problem of Philosophy of Religion.

2. Relation of Philosophy of Religion to Philosophy, to Theology, to Science.

   (i) Historical Development of Religion.

   (ii) Psychic Origin of Religion.

   (iii) Religious Experience and its Validity.

   (iv) Objects of Religious Experience : God
      (1) Proofs for the Existence of God.
      (2) Nature and Attributes of God.
      (3) Theories on God:
      Agnosticism, Deism, Pantheism, Theism.

   (v) God and the Absolute.

   (vi) God and the Universe :
   (Creation, Conservation, Concurrence and Providence).

   (vii) Problem of Evil.

   (viii) Religion and Man's Destiny :
   (Immortality of the Soul and Life Everlasting).

   (ix) Substitutes of Religion and their Evaluation :
   Atheism and Humanism.

Bibliography :

A. *Books for Study :*

EDWARDS D. MIALL : Philosophy of Religion.

GALLOWAY : Philosophy of Religion.

CLEASON, R.W. : The Search for God.

B. *Books for Reference :*

LOTZE (Hermann)	:	Outlines of Philosophy of Religions.
PATON, H.J.	:	Modern Predicament.
RAVEN, C.E.	:	Natural Religion and Christian Theology.
DE BURCH	:	Towards a Religious Philosophy.
VAN DER LEOWEA	:	Phenomenology of Religion.
SCHMIDT, W.	:	The Origin and Growth of Religion.
ABERNETHY, L & LANGFORD, T.A.	:	Philosophy of Religion.

Political Theory including a text:

(Syllabus same as for Branch II—Political Science—Vide Syllabus No. 12).

Modern Governments :

(Syllabus same as for Branch II—Political Science Vide Syllabus No. 14.)

(22)

General Psychology

Introduction : Definition of Psychology — its relation to other Sciences like Biology (with reference to life's physio — chemical substratum and Philosophical Immanence — to Sociology — Value of Psychology.

(i) Methods of Psychology : Introspection — Observation — and experiment — Case History and Clinical Methods.

(ii) Physical Bases of Mental life : The nervous system — the sense organs : Internal and External.

(iii) Heredity and Environment.

(iv) Sensation : Nature, kinds.

(v) Perception : Factors, theories, illusion.

(vi) Attention : Factors, kinds, distractions.

(vii) Memory : Factors, Methods, Forgetting.

(viii) Imagination : Dreams, Day dreams, Invention.

(ix) Thought : Difference between sense knowledge and intellectual knowledge — Process of thinking — Abstraction — Formation of ideas — Objects of thought.

(x) Learning : What is learning ? Kinds of learning — Trial and error — Learning by insight — Conditioned reflex.

(xi) Intelligence : Measurement of intelligence and intelligence tests.

(xii) Instinct : Nature — kinds ; — Instinct and intelligence — Principal instincts of Man.

(xiii) Feeling and Emotion.

(xiv) Rational Appetite and Free Will.

(xv) Personality Tests : Performance Tests, Question Tests, Rorschach Test, Thematic Test, Apperception Test.

Bibliography :

A. *Books for Study :*

GULFORD, J. P. : General Psychology.

DUTT, S. C. : Psychology.

B. *Books for Reference :*

WOODWORTH, R. S. & MARQUIS, D.G.
Psychology — A Study of Mental Life.

MUNN, N.L. : Psychology.

HARMON : Principles of Psychology.

BORNEY, LARYFIELD & WELD :
Foundations of Psychology.

Social Psychology :

(Syllabus same as for Branch III (*b*) Sociology Main — Vide Syllabus No. 29).

Social Anthropology :

(Syllabus same as for Branch III (*b*) Sociology Main — Vide Syllabus No. 27).

(23)

Cultural Anthropology

Anthropological definition of culture.

Group and Personality in relation to culture.

Co-operation, Competition and Conflict.

Economics and Anthropology.

Environment as the field in which culture operates.

Diffusion, convergence and independent inventions.

Culture areas, Culture centres, Culture Traits and Culture.

Complexes, Their distribution throughout the world.

Social contacts and culture change.

Land Tenure - The sociological background to land ownership.

Growth of money sense.

Trade and barter.

An outline of linguistic, religiot's and culture historic groups the world over, with special reference to India.

A detailed study of two prescribed monographs on one Indian and one non-Indian tribe or community.

Books :

Linston, R. : The Study of Man (1946, D. Appleton—Century Co., N.Y.)

Kluckhohn, C.K.M.—Mirror of Man (1949, McGraw Hill Book Co., Inc., N.Y., USA).

Ruth Benedict : Patterns of Culture (1936, George Routledge & Sons, Ltd., London.)

Herskovits, M. J. : Economic Anthropology.

Ogburn and Nimkoff : Sociology.

Lips, J. E. : The Origin of Things.

Evans-Pritchard : Social Anthropology.

Ehrenfels, U.R. : Mother-right in India (1941, Osmania University Series, Hyderabad (Dn). Oxford University Press, Madras, Bombay.)

Piddington : Introduction to Social Anthropology, Vol. I.

Beals, R. and Hoijer, H. : Anthropology.

Hoebel, A. E. : Man in the Primitive World.

Lowie, R. H. : An Introduction to Culture Anthropology (1934, Farrar & Rinehart, Inc., N.Y.)

Radcliffe Bromn, A. R. : The Andaman Islanders (Cambridge, 1922).

(24)

General Economics

1. Scope and Method of Economics — Nature of Economic Laws—Fundamental concepts.

2. Consumption — Wants and their nature — The Law of Diminishing Marginal Utility — Demand — Elasticity of Demand — Consumer's Surplus.

3. Production — Factors of Production and their combination— Laws of Returns — The organization of production — Division of Labour — Location of industry — Large scale production.

4. Economic Organization — Capitalism and Socialism — Mixed Economy — Types of production organization — partnership, joint stock companies, co-operative organization, State enterprise — Industrial combinations.

5. Value — The analysis of Supply and Demand — Value under perfect competition — Market value and Normal value — Joint demand and joint supply — Monopoly value — Monopolistic competition.

6. Distribution — General theory of distribution — Theories of wages, interest, rent and profit — The national income of India.

7. Money and Banking—Functions of money — Kinds of money — The Quantity Theory of Money — The gold standard — Paper money — Credit — Instruments of credit — Banks, commercial, industrial and land mortgage — The Central Bank and its functions with special reference to India — Components of the Indian money market.

8. International Trade — The theory of comparative costs — Balance of Trade and balance of payments — Indian Balance of Trade and payments — Free Trade and Protection — Foreign exchanges — The Purchasing Power Parity Theory.

9. Public Finance — Public expenditure and sources of public revenue — General principles of taxation — Revenue and Expenditure in India — Public Debt and its redemption.

10. Planning Economic development — India's Five Year Plans.

Books Recommended :

1. Benham : Economics.
2. Cairncross : Text-Book of Economics.
3. Banerjee, P. : A Study of Indian Economics. (Rev. Ed., 1954)

Indian Economic Problems

(Syllabus same as for Branch IV — Economics Main — Vide Syllabus No. 32).

Principles of Human Geography

[Same Syllabus prescribed under Group B of Branch I—History (Main). — Vide Syllabus No, 46(b).]

Social Geography of India

I. Social Geography of India—Definition and Scope

Physical and Biological background :

(*a*) The land, structure, relief and soil.

(*b*) Climate, the dominant role of the monsoons, the regional and seasonal incidence of rainfall.

(*c*) Plant cover — Forests — exploitation — Forest as a source of wealth.

Resources and their uses :

Land : Classification of land — forests and their utilisation — arable land — land use, problems connected with types of farming, practices, tenures and soil erosion.

Crop-Distribution :

(*a*) effect of relief, soil and climate, Traditional Practices.

(*b*) exotic plants.

(*c*) Cereals : Distribution, production and consumption studied in relation to regional dietetic practice.

(*d*) Supplementary food crops, beverages.

(*e*) Industrial crops — Sugar, Jute, Tobacco and Cotton. (special attention to be paid to self-sufficiency).

Live-stock : Distribution — bovine population standard in relation to fodder supply ; social beliefs and food habits — meat, milk and milk products — Self-sufficiency of India.

Other Animals

Power and Mineral resources : Power resources and Economic minerals—distribution, exploitation and uses.

Industry :

(*a*) Major industries

(*b*) Minor industries

(*c*) Cottage industries

(*d*) Location and Labour supply

(*e*) Social effects of industrialisation.

Trade and Transport :

II. People of India :

(*a*) Classification, races, tribes etc. Indian culture as the basis of homogenety of Indian people.

(*b*) Population Numbers — Distribution, rural and urbans population growth of cities, population growth and trends.

(*c*) Social problems of India as related to basic economic factors Living standards, literacy, Health and Hygiene Distribution of diseases.

Reference Books :

Spate : India and Pakistan

Sharma : Location of Industries

Mukherjee, R. K. : Food for four hundred millions

Howard : Agricultural testament

Indian Census Reports : 1931 and 1951

Thomas : India's Basic Industries

Gadgil : Industrial Development

Anstey : Economic Development of India

Government of India : Planning Commission — First Five-year Plan, Progress Report for 1953-54.

Branch III (b) Sociology Main

SYLLABI

Principles of Sociology

1. Nature and scope of Sociology and Social Sciences, Scientific nature of Sociology — methods.

2. Society — its nature — Organic conception — Animal and Human Societies. Theory of social evolution, its meaning, factors involved in social evolution.

3. Individual and Society : Modes, folkways, norms.

4. Socialising factors : Physical Geographic Biological — Nutrition and reproduction. Heredity and environment, Psychological, religious, ethical and aesthetic — Social Ecology.

5. Culture its meaning — Culture and civilisation, distinction — functions.

Culture, Variability and diffusion of culture, cultural lag.

6. Social Organization — family, state educational and recreational, religious, economic.

Social groups — Permanent, temporary, Primary, Secondary.

Their concept and significance in Society.

Social Control

7. Social Stratification — class, caste.

8. Social change — Biological, Technological and Cultural.

9. Social Pathology — nature — factors of maladjustments. Individual and social maladjustments. Poverty, crime, Drink evil, Divorce.

Books recommended :

Bottomore, T. B. : Sociology

Ogburn and Nimkoff : Hand book of Sociology

Anderson and Parker : Society

Suther land, Woodward and Maxwell : Introduction to Sociology

Bogardus : Sociology

Mac Iver and Page : Elements of Society

Radhakamal Mukerji : Social Ecology

Geinsberg : Sociology

Ross : Basic Sociology

Roserquist : Social Problems

Johnson : Sociology : A Systematic Introduction

Suther land, Woodward and Maxwell : Introductory Sociology.

(27)

Social Anthropology

1. Anthropology — nature and scope : relation to other social sciences.

2. Races of mankind — Criteria of racial classification — Racial characteristics — Distribution of races — Exaggeration of race element — Superiority and Inferiority — Ethnocentrism — Race tensions.

3. Anthropology and study of culture — cultured stages : Invention of implements. Paleolithic and Neolithic, metal age. Diffusion and parallelism, cultural lag.

4. Anthropology and study of social life : Primitive life and social organisation ; Primitive civilisation — food gathers — nomadic herdsmen — food producers — land cultivators — Bilateral organisation Family — marriage — divorce ; kinship ; class, sib, associations ; Property — property rights Law ; religion, magic : Dress, handicrafts.

5. Ethnography : meaning, study of social organisation of the Todas and the Kadars.

6. Advantages of studying simpler associations. The Adivasis and their problems as a result of contact with people outside the tribal areas.

Books recommended :

Ensenfel : Kadars of Cochin

Majumdar and Madan : Social Anthropology

Krishna Iyer and Balaratnam : Anthropology of India

Census of India, 1961, Vol. No. IX, Part V-B — Ethnographic Notes on Scheduled Tribes.

Census of India, 1961, Vol. No. Part V-C — Todas

Hoebel : Man in the Primitive World

Lewie : Social Organization

Lewie : Primitive Society

Evans Richard : Social Anthropology

Govt. of India : Scheduled Castes and Tribes.

(28)

Indian Social Institutions

1. General characteristics of Hindu social institutions : social and Cultural History of India.

2. *Hindu social organisation :* its basis, Varna, Ashrama, Karma, Dharma and Moksha.

3. Varna, Jati, Caste..................caste its origin, characteristics, functions, scheduled castes, Present day trends in caste systems. Caste and its impact on Indian Society. Caste system and democracy Caste and class traditions, relationship of members.

4. *Family in India :* Joint family, its structure, original advantages and present effects. Joint family disorganization ; family to-day.

5. *Marriages in India :* Gotra and Paravara ; types of marriages ; marriage restrictions, mate selections, inter-caste marriages, marriage to-day.

6. Status of women, past and present, widows question of divorce ; Hindu Code Bill.

7. The village organization ; panchayats ; their role ; present day trends ; village uplifts schemes......Sarvodaya ; Community Developments — its aims and working.

8. Impact of foreign culture on Indian social Institutioms.

Books recommended :

Prabhu, P. H. : Hindu Social Organization

Capadia, K. M. : Marriage and family in India

Ghurye, G. S. : Caste and Class in India

Ghurye, G. S. : Scheduled Castes

Hurtton : Caste in India

Radhakrishnan : Religion and Society

Venkatrayappa, K. N. : Feminine Roles

Govt. of India : Kurukshetra

Desai, A. R. : Rural Sociology

Census of India 1961, Vol. No. IX, Part VI— Village Survey monographs.

(29)

Social Psychology

Stand point and scope : Social Psychology and its relation to other Sciences.

Personality in Social and Cultural Settings : Social life at Pre-human levels. Inter-play of culture and personality. Modes of social interaction. Emergence of self-social types of personality. Cultural influences on thought precess and content.

Function of stero types in myths and ideologies.

Dominiance and leadership in human and sub-human groups.

Qualities of leader and leader selection. Mass behaviour. Psychological factors and mechanisms of crowd formation. Types and behaviour of crowds. Public opinion—Its nature. Rumour, News propaganda.

Primary and secondary groups.

Sociametry.

Social conflicts : Prejudices. Revolution. War.

References : Kimbal Young : Handbook of Social Psychology W. J. W.

Sprott : Social Psychology.

Kuppuswamy, B. : Social Psychology

Adinarayan, S. P. : Social Psychology

Akolkar : Social Psychology

Mukerji and Sengupta : Social Psychology

Bogardas : Social Psychology

Alport : Social Psychology

Kurch and Cruchfield : Social Psychology.

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Branch IV—Economics Main

SYLLABUS

Principles of Economics

(*a*) Definition and methods of Economics — Economic Laws — Fundamental concepts.

(*b*) Consumption — Law of Diminishing Marginal Utility — Law of Substitution — Demand — Law of Demand — The demand curve — Elasticity of demand — Consumer's Surplus.

(*c*) Indifference curves analysis — Consumer's equilibrium — Income effect and substitution effect — Derivation of demand curve — Supply curve.

(*d*) Production — Factors of production — Laws of Returns — Theories of population — Population growth and family planning in India — Accumulation of capital. Division of labour — Localisation of industry — Large scale production Internal and external economics — The optimum firm — The Law of supply — The supply curve — Elasticity of supply.

(*e*) Exchange — Market — pricing under perfect competition — price in the market period — price in the short period — cost of production fixed and variable costs — average marginal costs — price in the long period — Joint supply and joint demand — Speculation and prices.

(*f*) Pricing under monopoly — discriminating monopoly — pricing under imperfect competition — Oligopoly price, Product differentiation and selling costs.

(*g*) Distribution of income — Marginal productivity theory Gross National Product and national income — Measurement of national income with particualr reference to India — Inequalities of income.

(*h*) Wages — Theories of wages — differences in Wages — Trade unions and wages — Minimum wages — Full employment and unemployment.

(*i*) Rent — Ricardian theory of rent — Modern theory of rent — Rent and transfer earnings — Rent and price — Quasi-rent.

(*j*) Interest — Gross and net interet — theories of interest Liquidity preference — Interest and employment.

(*k*) Profits — Gross profits and net profits — entrepreneur and his functions — Theories of Profits — Risk and uncertainty.

(*l*) Economic thought — Adam Smith — Karl Marx — Alfred Marshall — John Maynard Keynes — M. K. Gandhi.

(*m*) Comparative economic systems — Capitalism — Socialism Co-operation — Mixed Economy — Sarvodaya.

Text-Books :

1. Economics : Paul A. Samuelson
2. Economics : F. Benham
3. A text-book of economic theory : Stonier and Hague
4. Modern economic theory : K. K. Dewett
5. Advanced economic theory : A. V. Ranganadhachary
6. Principles of economics : V. Ganapathy
7. பொருளாதார கோட்பாடுகள் : Frederic and Balasubramanian

8. புதுமைப் பொருளாதார இயல் : Blessed Singh.

9. பொருளாதாரம் : C. Velayudam

10. Development of economic doctrines — Alexander Gray.

11. History of Economic thought : S. K. Srivastava.

12. History Economic thought : Bhatnagar and Bhahadur.

Books for Reference :

1. Value and Capital : J. R. Hicks.
2. Price theory : W. J. L. Ryan.
3. Principles of economics : K. P. M. Sundaram and M. C. Vaiah.
4. History of economics thought : Haney
5. The development of economic thought : P. C. Newman
6. Ten great economists : J. Schumpeter.

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Currency Banking, Public Finance and International Trade

I. (*a*) *Money :*

Need for Money — Difficulties of Barter economy — *Evolution of money* — Functions and kinds of money, *Role of money in Capitalist and Socialist economies*, Monetary Standards — Mono-metalism — *Bimetalism — Gold Standard* — different types of gold standard—failure of gold standard — Paper currency standard — Principles and systems of note issue *with special reference to India.*

(*b*) *Value of money and its measurement :*

Index Numbers — Price Index numbers — consumer price index numbers — quantity theory of money — *Fishers*, Cambridge equations — Income theory.

(*c*) *Inflation and Deflation — Effects of changes in the* value of money — Control of inflation.

(*d*) Trade—cycles — Theories of Trade-cycles, Causes of Trade-cycles — (1) Real causes (2) Monetary causes (3) Psychological causes — (4) Variations in savings and spending — Control of trade-cycles.

II. (a) *Banking :*

Unit and Branch Banking — Functions of Commercial banks — Liquidity and Profitability — the creation of Bank credit — State regulation of banking — Social Control and nationalisation.

(b) Central Banks : Functions — Credit control — Quantitative and qualitative methods.

(c) Money markets : Organised and Un-organised money markets ; London Money Market — New York Money Market and Indian Money Market — Bills of exchange — Discount Houses.

III. *International Monetary Co-Operation :*

(a) The problem of International Payments — Foreign exchange— Mint Partheory of exchange — The purchasing power parity theory — The equilibrium rate of exchange — Exchange control

(b) International Monetary Fund — Objectives and achievements — International Bank for Reconstruction and Development and affiliates and achievements — Objectives.

IV. *International Trade :*

Distinction between internal and international trade — The Theory of Comparative cost—Modern Theory of international trade — Terms of trade — Balance of trade and balance of payments — Correction of disequalibrium in balance of payments — Theories of Protection — Free trade Vs. Protection.

V. *Public Finance :*

Public finance — Growth of Public expenditure — Its importance — Items of Public Revenue — Theories of Taxation and incidence of taxation — canons of taxation — Direct and indirect taxes — Progressive taxation — Public Debt — Federal Finance — Allocation of resources between the Centre and the States in India.

Books recommended :

1. Sayers — Modern Banking.
2. Whale — International Trade.
3. Dalton — Public Finance.
4. Crowther — An outline of money.
5. Sundaram, K. P. M. — Currency, Banking and Finance.
6. Sanyasiah and Ranganathachariar, A. V.—Money, Banking, International Trade and Public Finance.

Indian Economic Problems

(1) The problems of population in India — Trends in the growth of population — Birth and death rates — Effects and rapid growth of population — Family Planning in India.

(2) National Income of India — Its growth and composition per capita income in India — Reasons for inequalities.

(3) Agriculture — Main features — Size of holdings — Land reforms — Agricultural marketing problems — Financing of agriculture — Agriculture under Five Year Plans.

(4) Co-ôperation — in Agriculture — in Industry — in Trade — in Credit — Problems.

(5) Location, organisation and management — Financing — Industrial Policy — Industry under five year plans — case studies of problems from textile, steel, jute, cement and sugar industries — Small and Cottage industries — Agro-industries.

(6) Labour Problems — Trade Unions — Industrial disputes — Problems of employment — Employment Exchanges — Social insurance — Minimum wages — Labour participation in management — Transport problems, Roads, Railways and shipping and air transport — Transport co-ordination.

(7) Strategy of foreign trade—Export promotion and tariff policies

(8) State and Economic Planning — Study of Community Project. — Five Year Plans in India.

(9) Monetary problems : Money Market — State Bank of India, Nationalised Banks, Commercial Banks — India and International Monetary Fund.

(10) Reserve Bank of India and Control of credit.

(11) Indian Finance — Main sources of revenue — Heads of expenditure of the Union and State Governments — The Indian Public Debt.

Books recommended :

1. Balakrishna, R. — Studies in Indian Economic Problems.
2. Lewis, J. P. — Quiet Crisis in India.
3. Sundharam, K. P. N. and Datt — Indian Economy.
4. Alak Ghosh — Indian Economy.
5. Reddaway — Indian Economy.

6. Lakshmi, H. — Problems of Economic Development.
7. Dewett, K. K. Singh and Varma — Indian Economics.
8. Namathu Porulathara-p-pirachanaigal (in Tamil) by Prof. Sundararajan, S. and Capt. Kuladainathan. Vol. I and II.
9. இந்தியப் பொருளியல் — Balasubramaniyam, M.
10. இந்தியாவின் பொருளாதார வளர்ச்சி—Velappan, T.

(33)

Modern Economic Development in U.K., U.S.A., U.S.S.R. and Japan

1. U.K. : The Industrial Revolution — The Agrarian Revolution — The Railways and Shipping in England — The working class movement — Growth and Social Security — Commercial Policy in the 19th and 20th Centuries — Development of Banking and Finance.

2. U. S. A. : Industrial Revolution (Transformation from an agricultural into powerful industrial country) — Growth of combination — Railways in U. S. A. — Revolution in agricultural methods and technique — Immigration tariff policies — Great depression — New-deal — Effects of II World War — U. S. A. in the post-war years — Trade Union movement — Federal Reserve system.

3. U. S. S. R. : Effects of I World War — War communism — New Economic Policy — Planning and financial system — Industrial developments — Labour movement — Agricultural development — — Collective farms — Effects of the II great war on Russian economy — Trade Unions — Foreign trade — Russia in the post-war years.

4. JAPAN : Japan since 1914 ; Features of Japanese Agriculture — Industrial development , Economic Policy and the Zaibatsm — Small scale industries — Tariff Policy — The foreign trade — The Trade Unionism — Labour Legislations — Reflation and war preparation — Transport Development — The Banking system — Population — Effects of the Second World War — Japan in Post-War years.

Books Recommended :

Economic History of England — Southgate.

Hand Books of Britain.

Growth of the American Economy — Williamson.

American Economic History — Faulkner.

Russian Economic Development since the Revolution — M. Dobb.

An Economic History of Japan — W. C. Allen.

Modern Economic Development of Japan — Lockwood.

Economic Survey of Japan — (Japan times — 1961-62).

BRANCH V — GEOGRAPHY MAIN

Principles of Human Geography and Regional Geography of India.

Part A — Human Geography

I. Scope of Human Geography — Determination and possibilism — Man's response to environment.

II. Distribution of land and sea and general relief features of the earth — Major natural regions.

III. Stages in the cultural development of man — Primitive food hunting and fishing, pastoral nomadism, shifting cultivation, subsistance, Commercial, Plantation forming, Simple industrial to specialized manufacturing stages.

IV. Modes of life in relation to levels of culture and civilisation — Occupation and rhythm of life.

V. Distribution of man — Patterns — rural/urban inter-dependence.

VI. Classification and distribution of races.

VII. Human migration and problems.

VIII. Man and culture — Cultural contacts and clashes.

Reference :

Huntington : Principles of Human Geography.

Thompson : Population problems.

Daryll Forde : Habitat, Economy and Society.

Chandrasekar : Population problems and food supply.

D. C. Money : Human Geography.

Clarke : Population Geography.

Nesturkh, M. : The origin of Man.

Zelinsky : A prologue to population Geography.

Part B — Regional Geography of India

I. Space relations — India and World.

II. Structure, relief, drainage, climate, natural vegetation and soils.

III. Resources and utilisation :

(*a*) Agriculture and Irrigation — Types and distribution

(*b*) Livestock and fisheries

(*c*) Minerals and Power resources

(*d*) Industries and Industrial regions.

IV. Trade and Transport.

V. Population — Distribution and problems.

VI. Natural regions with special reference to Tamil Nadu.

References :

Spate, O. H. K.	:	India and Pakistan
B. S. Rao	:	Industries of India, Vols. I and II
Kuriyan, G.	:	India—A General Survey (National Book Trust, India, New Delhi, 1969)
Government of India	:	Five Year Plans
Government of India	:	Census of India Vol. 1961
Dubey and Nogi	:	Economic Geography of India
Wadia	:	Geology of India
Das Gupta	:	Economic and Commercial Geography
Randava	:	Agriculture and Animal Husbandry in India.
Government of India	:	The Gazetteer of India, Vol. I—Country and People (Publications Division Ministry of Information and Broadcasting, 1965).

Physical basis of Geography

I. *The Atmosphere :*

The composition of the Atmosphere — The elements and factors of weather and climate — Insolation — Vertical and horizontal distribution of temperature — Distribution of pressure and winds — Monsoon — Local winds — Humidity — Precipitation — Cyclones, Air-masses and fronts — Climatic types.

II. *The Land :*

(*a*) Origion of the Earth—Earth's interior—Isostasy—Mountain building — Volcanoes and Earthquakes.

(*b*) Materials of the earth's crust — Major rock types — Agents or weathering and denudation — Cycles of Erosion — rivers underground water, winds, waves, glaciers.

(*c*) Formation and classification of Islands and lakes.

(*d*) Factors of soil formation — classification and distribution of soil types.

III. *The Ocean :*

Relief of the Ocean floor — Distribution of surface temperature and salinity — Movements of Ocean waters (waves, tides and currents) — Deposits of the Ocean floor — Coralreefs.

References :

Cotton	:	Landscape
Wooldrige & Morgan	:	Physical basis of Geography, Geomorphology.
Monkhouse	:	Principles of Physical Geography
Lake	:	Physical Geography (2nd edition)
Das Gupta and Kapoor	:	Physical Geography
Kendrew	:	Climatology

Trewartha	:	An Introduction to climate
Finch etc.	:	Physical elements of Geography
Potterson	:	Introduction to Meteorology
Sharma and Vatal	:	Oceanography for Geographers
King, C. A. M.	:	Oceanography for Geographers
J. Bucknell	:	Climatology : An introduction
Mary Robinson	:	Morphology and Landscape
Dudly Stamp	:	The Earth's Crust.

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Regional Geography of the World

Part A :

General study of Asia, Europe and North America — Discoveries, Expeditions, Explorations — Structure and Relief — Climate — Natural vegetation.

General study of the following natural regions :

Asia : S. E. Asia, S. W. Asia, China, Japan, Asiatic U. S. S. R.

Europe : Fenno Scandinavia, United Kingdom, France, Low countries, Central Europe, Mediterranean Europe.

North America : Canada/U. S. A.

Part B :

A comparative study of Southern continents.

References :

Preece and Wood	:	Europe
Shackleton	:	Europe
Cressey	:	Asia, Lands and Peoples

Guttman	:	Europe
Stamp	:	Africa
Suggate	:	Africa
Stamp	:	Asia
Suggate	:	Australia
Unstead	:	World Survey
Rodwell Jones	:	North America
Shanahan	:	South America
D. C. Money	:	South America
Stamp and Beaver	:	British Isles
Trewartha	:	Japan
Cressey	:	Foundations of China
Grifith Taylor	:	Australia
Sharaf	:	A Short History of Geographical Discovery.
Coyah and Tomilinson	:	The Southern Continents
Shahabad	:	Natural Regions of U.S.S.R.
Fisher, W. B.	:	The Middle East
Spencer	:	Asia, East by South
Lavrishehaw, A.	:	Economic Geography of the U.S.S.R.
Dobby	:	South East Asia
Coyah and Tomilinson	:	North America.

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Practical Geography and Practical Test

Practical I.

Preliminary exercises in map work — catographic representations Diagramatic representations of climatic and other statistical data — Map interpretation — Use of weather instruments — Study of Indian daily weather reports — field studies (report to be submitted).

Practical II.

(*a*) Graphic method of construction, properties and uses of the following projections :

Simple conical with one and two standard parallels, plyconic, Bonne's cylindrical equal area, equi-distant, Mareator Zenithal, (Polar cases only), Sinucidal and Mellweide projections.

(*b*) Study and use of the following instruments :

The chain, Prismatic compass, plane-table, dumpy level, Theodolite (Horizontal angles only).

References :

Singh and Dutt	:	Elements of practical Geography
Steers	:	Map of projection
Monk-house	:	Maps and Diagrams
Raise	:	Principles of Cartography
Dury	:	Map Interpretation
Garnett	:	Interpretation of topographic maps
Thomas Pickles	:	Map Reading
Kariyan and Prakh	:	Practical Geography
John Dygett and D. C. Money	:	An introduction to map work and practical Geography
James Main Warin	:	An Introduction to the study of map projection.
L. H. Williams	:	Introduction to map work
Margarat Wood	:	Foreign maps and Landscapes.

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Branch VI—Philosophy Main

Essentials of Philosophy

(Reality and Knowledge)

Introduction : Definition and Scope of Philosophy.

I. *Reality :*

1. *Matter :*

(*a*) Theories on matter : Dynamism, Mechanism, Hylomorphism.

(*b*) Problems of Space and Time

(*c*) Laws of matter : Determinism

(*d*) Miracles (Possibility and Knowability).

2. *Mind :*

Mental Processes : Simple apprehension, — Judgement — reasoning (deductive and inductive)

3. *Soul :*

(*a*) Nature : Substantial, Spiritual and Personal

(*b*) Freedom

(*c*) Immortality

4. *God :*

(*a*) Existence

(*b*) Nature and attributes.

II. *Knowledge :*

1. Problem of knowledge :

(*a*) Sources : Experience — Reasoning — Institution

(*b*) Validity : Scepticism, Idealism, Realism and Pragmatic sm.

2. The Problem of Truth :

(*a*) Meaning and criterion of Truth — Correspondence Theory — Coherence Theory — Pragmatic Theory.

(*b*) Error : Nature and degrees of error.

3. The Problem of the Universals :

Realism — Conceptualism — Nominalism.

Bibiliography :

A. *Books for Study :*

Patrick : Introduct on to Philosophy

Maritain : Introduction to Ph losophy

Ewing, A.C.	:	Fundamental on of Questis Philosophy
Carr, W.	:	Problem of Truth
Van Steenbergher — Flynn	:	Epistemology
Gallenghen	:	The Philosophy of knowledge

B. *Books for Reference :*

Joad, C. E. M.	:	Introduction to Modern Philosophy
Russell, B.	:	The Problem of Philosophy
Moore, G. E.	:	Some Main Problems of Philosophy
Maritain, J.	:	Three Degrees of Knowledge
Maritain, J.	:	Philosophy of Nature, Science and Wisdom.
De Reamaeker	:	Introduction to Philosophy
Edgar G. Brightman	:	Introduction to Philosophy
Ayer, A.J.	:	Theory of Knowledge.

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Indian Philosophy

Introduction : Essential teachings of :

1. The Vedas (Evolution of Religion)
2. The Upanishads (Atman, Universe, Brahman)
3. The Bhagavad Gita (The three Yogas).

I. *The Non-Vedic Systems :* Essential teachings of :

1.	Caravaka	:	Epistemology, Metaphysics and Ethics.
2.	Jainism	:	Nayavada and Syadvada Anekanta-vada Atma, Dharma, and Moksa.
3.	Buddhism	:	Anatma — the four — fold — fold Noble Truths — the eight-fold path — Nirvana.

II. *The Vedic Systems :* Essential teachings of :

1. Samkya : Prakriti and Purusha — Satkaryavada — Theory of Evolution.

2. Yoga : The eight limbs of Yoga — the concept of God.

3. Nyaya : Pramanas — Categories — God — Soul and its destiny.

4. Vaisesika : : Atomism — God.

5. Purvamimamsa : The authority of the Vedas—Dharma.

6. Vedanta :

   (*a*) Advaita : Absolute and God. Doctrine of Maya—Avidya—Vivarta Vada. The doctrine of non-difference, Means of Moksa — Jivanmukti.

   (*b*) Visishtadvaita : Distinction from Advaita. Nature of Brahman, Jiva and Prapancha, Ethics, Religion and Moksa.

   (*c*) Dvaita : Nature of God, Soul and Matter. Ethics and Religion.

   (*d*) Saivasiddhanta : God, Soul and Matter. Theory of Males. Stages in Spiritual growth.

III. *Modern Thought :* Essential teachings of :

1. Swami Vivekananda
2. Rabindranath Tagore
3. Sri Aurobindo
4. Radhakrishnan.

Bibliography

A. *Books for Study :*

Hiriyana, M. : Essentials of Indian Philosophy

Radhakrishnan, S. : History of Philosophy Eastern and Western

Datta & Chatterjee	:	Introduction to Indian Philosophy
Datta, D. M.	:	The Chief Currents of Contemporary Philosophy (relevant Chapters)
Naravane, V. S.	:	Modern Indian Thought
Srivastava, R. S.	:	Contemporary Indian Philosophy

B. *Books for Reference :*

Chandradar Sarma	:	Critical Survey of Indian Philosophy
Maxmuller	:	Six Systems of Indian Philosophy
Radhakrishnan	:	Indian Philosophy (Two Volumes)
Dasgupta, S.	:	History of Indian Philosophy (V Vol.)
Radhakrishnan	:	Contemporary Indian Philosophy (relevant Chapters)

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Western Philosophy

I. *Pre-mediaeval and Mediaeval Philosophy :* Being — Properties of Being — Constitutive Principles of Being — Categories — Causality.

II. *Modern Philosophy :*

1. Rationalism of Descartes : Method of Doubt — God — Mind and Matter.
2. Empiricism of Hume : Consistant development from Locke and Berkeley — Criticism of Substance, Self and Causality.
3. Critical Philosophy of Kant : The Problem — Possibility of Metaphysical Knowledge — God — Freedom — Immortality.
4. Idealism of Hegel : The Dialectial Method — Absolutism.

III. *Contemporary Philosophy :* Essential teachings of :

1. Existentialism
2. Critical Realism
3. Logical Positivism
4. Phenomenology.

Bibliography

A. *Books for Study :*

Thilly, F.	:	A History of Philosophy
Renard	:	The Problem of Being
Maritain, J.	:	Introduction to Philosophy
Maritain, J.	:	Seven Lectures on Being
Wright, W. K.	:	History of Modern Philosophy
Breish, E.	:	Introduction to Modern Philosophy
Delfgar	:	Twentieth Century Philosophy

B. *Books for Reference :*

Stace, W. T.	:	A critical Survey of Philosophy
Bergmann, G.	:	Logical Positivism
Grene, M.	:	Introduction to Existentialism
John Kemp	:	The Critical Philosophy of Kant
Marcel, G.	:	The Philosophy of Existentialism
Russell, B.	:	History of Western Philosophy
Copleston	:	History of Philosophy (Eight Volumes)
Gilson, E.	:	The Spirit of Mediaeval Philosophy

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Ethics

Introduction : Definition and Scope of Ethics. Acts of man and human acts. Imputability. Principle of double effort. Impediments of human acts. End of human acts. Motive and intention. Character and conduct. The moral self.

I. *Methods and theories of Ethics :*

Hedonism (ancient and modern) — Kantianism — Evolutionism — Idealism — Pragmaticism — Marxism — Sarvodaya.

II. *The Norm of Morality :*

The ultimate and proximate norms, is manifestation in conscience ; Various opinions about the norms of morality — Situation Ethics — Origin, nature, aim and critical evaluation.

III. *Obligation and Sanction :*

The nature of obligation and the need of sanction — kinds of sanctions — Theories of Punishment.

IV. *Rights and Duties :* Their nature :

(*a*) Fundamental rights : Personal rights and their limitations.

(*b*) Duties of man in his individual dimension ; Duties towards God — Religion ; Duties towards self and towards others.

V. *Duties of Man in his Social Dimensions :*

With reference to family, State, International Society — UNO.

VI. *Social Questions :*

1. Justice : Cumulative, distributive, legal and social justice.

2. Private Property and its scope : Various opinions about private property, its limitations and social function, property and land ceiling.

3. Work and remuneration : How to fix the wage or salary ? Industrial workers' problem. Trade Unions.

4. Mass Media and Ethics : News Papers and Magazines, Radio and Films.

Bibliography

A. *Books for Study :*

Bittle : the Philosophy of Morality

Ewing, A. C. : Ethics

Mackenzie, J. S. : Manual of Ethics

William Lilly : Ethics

Menner : Social Ethics

B. *Books for Reference :*

Burke : Ethics

Murray Michael : The Problem of Ethics

Higgins : Man and Man

Renard	:	The Philosophy of Morality
Sharma, I. G.	:	Ethical Philosophies of India
Meglynn	:	Modern Ethical Theories
Mahadevan, T. M. P.	:	Outlines of Hinduism
Hill, T. E.	:	Contemporary Ethical Theories
Dewy and Tufts	:	Ethics
Bernard Haring	:	Law of Love

Branch XII—Languages

B.A. Br. XII (*a*) — Tamil

ILAKKIYAM 2 — Prescribed Texts II

1. Periyalvar Passurangal — Thiruthalattu, Ambulipparuvam, Chengiraipparuvam, Sappanipparuvam.

2. Manickavasagar — Thiruvammanai, Thirupporchunnam, Thiruchalal, Thirupponnusal.

3. Periyapuranam — Kannappanayanar puranam.

4. Kambaramayanasaram — Sundarakandam — Kaatchi — Nindanai, Thiruvaditholuda Padalangal.

5. Villiputhurar Bharatham — Rajasuyasarukkam.

6. Bharathiyar — Panjali Sabatham.

7. Krishnapillai — Siluvaippattu (Ratchanya Saridam Padalam — padalgal 304 to 425).

History of Tamil Nad and Culture.

I. *History :*

1. Sources of our study.

2. Influence of Geography on History — Historical divisions of the country in the various periods.

3. The culture of the earliest inhabitants — Old Stone age — New Stone age — Race types — Linguistic and cultural affinities — Megalithic monuments — Rock paintings — painted pottery etc.

4. Pre-Cankam history and culture — Cankam age — Foreign contacts.

5. Past Cankam period — Kalabhras — Foreign influence — Pallavas' conflict with the north and the south — the Pandyas, Mutharaiyas, Irukkuvel — the religious condition — Village community and the local self-government — Polity.

6. The later Colas — their growth — conflict with other powers — their influence in and outside India — the Rise of the later Pandya power — the conflict of the Colas, Pandyas, Hoysalas and Yadavas.

7. The fall of the Tamil political power — influence of Vijayanagar rules, Nayaks, Marattas, the development of western and Muslim influence — the Palayagars.

8. The struggle for freedom — Gandhian Era.

II. *Culture :*

The social and economic conditions — literature — Religion and Philosophy — Paintings — Sculpture — Iconography — Architecture — Music and other Fine Arts — Handicrafts — Polity, Custom and law, all forming a distinctive culture developing from age to age influenced by and influencing others.

Books Recommended :

1. Colar Koil Panikal by J. M. Somasundaram Pillai.
2. Pandiyar Koil Panikal by J. M. Somasundaram Pillai.
3. Alaku Kalaigal by Seeni Venkatasamy.
4. Intiyaccirpankal by R. S. Rukmini.
5. Ten Intiyaccirpankal by Kanakarathinam.
6. South Indian History by Nilakanta Sastry.
7. Ten Intiya Varalaru by K. K. Pillai.
8. Tamilaka Varalaru by M. Arokiyaswamy.
9. Pantainalaiya - Ceramannargal by Avvai Doraisamy Pillai.

History of Tamil Literature.

History and development of various trends and their changes in the subject matter, idiom, rhythm and verification and other modes of expression generally, all through the ages and in particular from age to age or century to century :

1. The condition of literature as may be gleaned from Tolkappiyam.

2. Cankam period — Characteristics of Cankam literature, the conception of Tokai and the absence of Epic before Cilappatikaram.

3. The eighteen ethical works — their general trends and characteristic features — inter relations — influence of Kural and its place in Tamil Literature — the relationship between Kilkkanakku and Melkanakku — the latter Ethical literature and their relationship with Kilkkanakku.

4. Growth of Epics — Cilappatikaram — its relationship with Cankam age — its influence on later day literature — its relationship with Manimekalai.

5. The so called major and minor five epics — a criticism of this conception from the historical and literary point of view.

6. Kamba Ramayanam — its age — characteristic features — importance and influence.

7. Periyapuranam — its age — characteristic features — importance and influence.

8. The later Sthala Puranas.

9. The various kinds of prabandams — their rise and development in general with an explanation of the influences shaping them.

10. The folk song influencing literature from time to time.

11. The history of drama—Kruvananchi, Pallu—Nondi natakam, Kirthanai natakam — Foreign dramas and their influence, modern dramas, radio dramas and cinemas.

12. Prose — Development from the earliest age to the modern times.

13. Modern trends and modern kinds of literature.

14. Religion and Philosophy in Tamil Literature — their developments and varieties.

15. The general trends of the Cankam age, of the Pallava age, of the later Colas, of the later Pandyas, of the Vijayanagar period and of the period of the western influences.

16. The contributions of the various religions and their institutions (Mutts) etc. to Tamil Literature.

Books Recommended :

1. K. S. Srinivasa Pillai—Tamil Varalaru, Parts I and II.
2. K. Subramania Pillai—Ilakkia Varalaru.
3. Somasundara Desikar — 16th century Tamil Poets, 17th century Tamil Poets.
4. Sadasiva Pandithar—Pandai Tamil Ilakkiya Varalaru.
   (*a*) 300—600 A.D.
   (*b*) 13th, 14th and 15th centuries.

ILAKKIYAM 1—(Prescribed Texts I)

1. Purananuru — 101 - 150 padalgal.
2. Kurunthogai — 101 - 150 padalgal.
3. Pathupattu — Sirupanarruppadai.
4. Pathirruppattu — Aindam pattu.
5. Thirukkural — Paayiram, Arathuppal (Mudal pathu adhikarankal).
6. Cilappatikaram — Venchikkandam.

ILAKKANAM, SEYYULIYAL, PORULADIKARAM

1. Nannul Kandigaiurai — Sadagoparamanujachariyar.
2. Yapperumkalakkarigai — Palaiya Urai.
3. Dandiyalankaram — Porulaniyiyal.
   (விரிவாக அல்லாமல் பொதுப் படிப்பு மட்டும்)
4. Tholkappiyam — Agathinaiyiyal, Purathinaiyiyal.
   நூற்பாக்கள் மட்டும்.

TAMILMOLI VARALARUM DRAVIDA MOLI OPPILAKKANA ADIPPADAIGALUM

Dravidian Comparative Grammar :

1. Syllabus for the History of Tamil language — General :

The Place of Tamil in the Dravidian family of languages — its high antiquity — its geographical area in ancient times — the centamil and kotuntamil countries — very early cultivation of Tamil — the three Cankams.

The Period of Tamil Language :

The Old or Cankam Tamil—The Mediaeval Tamil and the Modern Tamil — Illustrative literature of each period — Grammars of the different periods — The extent of foreign influence on Tamil Grammars.

Phonology :

Vowels — Their relationship to the primitive Dravidian vowel system — History of vowels — Accent and Emphasis — Rising, Falling and Vanishing accents — influence of accent on word change in prosody — Alapedai — Mutation of vowels — Vowel Harmony — Vowel sandhi — Glides.

Consonants :

Their relation to the primitive Consonants — History of consonants — Mutation of consonants, Palatalization, Dentalization, unvoicing, voicing, constant length, assimilation, Alapedai, Consonantal sandhi.

Laws of Tamil syllabation :

Difference between Tolkappiyam and Nannul — Light or the Nature of Loan words.

Morphology :

Historical treatment in the old and modern Tamil of the following :

Nouns — pronouns — case.

The verbs.

The passive voice.

The Moods — Imperative, Infinitive, Subjunctive.

The Tenses — The tense — formation — The principles of their use — Negative particle.

The relative and verbal participles.

Word building — by composition — compound — words. (Tokai : Ummai, Uvamai, etc.) — Derivation — By root creation, back formation, double bases etc.

Vocabulary :

The General character of Tamil vocabulary at different periods — borrowings — Their causes — doublets — Telugu and Kannada elements in Tamil — Loss of old words — Nature and extent — Sanskrit words — Tatsmas — Tadbhavas — (Rules regarding these) — Prakrit borrowings Panipravala style — other borrowings (Hindi, Portugese, English etc.) — Hybrids — tests for distinguishing Loan words.

Semantics :

Changes in the meaning of words—elevation, degradation, specialization and generalization from age to age.

Syntax :

Historical study of the order of words in a sentence — deviation from the normal — causes — difference between the Syntax of Poetry and Prose — Foreign influence in Tamil Syntax.

2. Syllabus for the Elements of the Dravidian Comparative Grammar :

Dravidian Language :

The Dravidian Group of Languages and their chief characteristics — Enumeration of the Dravidian Languages.

Dravidian Phonology :

The Primitive Dravidian Parent Language — Vowel system — changes — Accent — Harmonic sequence of vowels — system of consonants — origin of cerebrals (Retorfled) — Dialectic inter change of consonants — Euphenic Permulation of consonants — Sandhi — Nasalization — Prevention of Hiatus Dravidian syllabation.

Dialect :

Centamil and Kotuntamil.

Morphology :

The Noun

Gender — Dravidian Nouns divided into two classes denoting rationals and irrationals.

Number — Singular and plural — No dual — singular — Masculine, Feminine and Neuter — Plural — Principles of Pluralization — case — principles of case formation — Dravidian cases — comparison with Sanskrit cases.

The Pronoun :

Pronouns of the first and the second persons — comparison of dialects — the Reflexive Pronouns — Pluralization of the personal and Reflexive Pronouns — Demonstrative and Interrogative pronouns — Their bases — Demonstrative and Interrogative Adjectives and Adverbs — Honorific Demonstrative Pronouns.

The Verbs :

Structure of the Dravidian verbs — Roots uses either as verbs or nouns — formative particles often added to roots — classification of verbs — Casual verbs — Their formation.

Frequentative Verbs :

Conjugational system — Formation of the tenses — Their significance and force — The present tense — The Preterite tense — The future tense — the Verbal and relative participles.

Formation of Moods — Methods of forming the conditional — the imperative and the infinitive.

The Voice — Active and Passive — the Negative voice — combination of negative Particles with Verbal Themes — the Dravidian Negative Particles.

Formation of Verbal Nouns, Derivative Nouns and Abstract Nouns.

Comparative Syntax :

The Syntax of the several languages compared — The extent of Foreign influence over the syntax of the several language.

Books :

1. Tamil Moli Varalaru : Kaviraja Pandithar Rama Subramaniya Navalar.
2. Moli Varalaru : Dr. M. Varadarajan.
3. Moliyiyal : R. Srinivasan.
4. Oppilakkanam : Pulavar Govindan.

Branch XII—(b) Tamil

தாள் 1 : இலக்கியம் — 1

திருக்குறள் : அறத்துப்பால், துறவறவியல்

புறநானூறு : 1-50 பாக்கள்

அகநானூறு : 1-50 பாக்கள்

சிலப்பதிகாரம் : மதுரைக் காண்டம்

தஞ்சைவாணன் கோவை

தாள் 2 : இலக்கணம் — 1

தொல்காப்பியம் : எழுத்ததிகாரம் — இளம்பூரணம்

தொல்காப்பியம் : பொருளதிகாரம் — அகத்திணையியல்

அகப்பொருள் விளக்கம்.

தாள் 3 : இலக்கியம் — 2

திருக்குறள் : பொருட்பால் — அரசியல்
கலித்தொகை — பாலைக்கலி

பதிற்றுப் பத்து : இரண்டாம் பத்தும், மூன்றும் பத்தும்

பெரியபுராணம் : மெய்ப்பொருள் நாயனார் புராணம்—இளையான்குடிமாறர்

தாள் 4 : இலக்கணம் — 2

தொல்காப்பியம் : சொல்லதிகாரம் — சேனாவரையம்

தொல்காப்பியம் : பொருளதிகாரம், புறத்திணையியல்

புறப்பொருள் வெண்பாமாலை

தாள் 5 : இலக்கியம் — 3

திருக்குறள் : பொருட்பால் — அமைச்சியல், ஒழிபியல்

பத்துப்பாட்டு : பொருநராற்றுப் படை

சிந்தாமணி : காந்தருவதத்தையார் இலம்பகம்

பெருங்கதை : இலாவண காண்டம்

திருவாசகம் : திருச்சதகம் 1-50 பாக்கள்
ஆண்டாள் திருப்பாவை

பதினோராம் திருமுறை : பட்டினத்தார் பாடல்கள்

பாரதியார் பாடல் : பாஞ்சாலி சபதம்

தாள் 6 : இலக்கணம் — 3

தொல்காப்பியம் : பொருளதிகாரம், மெய்ப்பாடு, உவமம், வரவு

தண்டியலங்காரம்

மாறன் அலங்காரம்

தாள் 7 : தமிழ்மொழி வரலாறும், திராவிட மொழிகளின் ஒப்பிலக்கணமும் :

(அ) தமிழ் மொழி வரலாறு — பாடத்திட்டம் :

பொது : திராவிட மொழிக் குடும்பத்தில் தமிழின் இடம் — அதன் தொன்மை — பழங்காலப் பகுதிகளில் தமிழ் வழங்கிய நிலப்பகுதி — செந்தமிழ், கொடுந்தமிழ் நாடுகள். மிகப் பழங்காலத்திலேயே தமிழ் செம்மையுற்றமை — முச்சங்கங்கள்.

தமிழ் மொழி வரலாற்றில் காலப் பிரிவுகள் : பழைய அல்லது சங்கத் தமிழ், இடைக்காலத் தமிழ், இக்காலத் தமிழ். இக் காலங்களின் தமிழியல்பை எடுத்துக் காட்டும் இலக்கியங்கள், இலக்கணங்கள்—தமிழ் இலக்கியத்தில் அயன் மொழி செல்வாக்குகள்.

ஒலியியல்: உயிர்கள் — திராவிட மூதாதை மொழியின் உயர் ஒலிகளுடன் அவற்றின் தொடர்பு, உயிர், ஒலிக

ளின் நிரல்—அவற்றின் வரலாறு, ஒலியழுத்தம், எடுத்தல், படுத்தல், நலிதல் முயற்சிகள்—சொல் மாற்றத்திலும், யாப்பிலக்கணத்திலும் ஒலியழுத்தத்தின் செல்வாக்கு அளபெடை உயிர் ஒலி மாற்றம், உயிர் ஒலி இயைபு, உயிர் ஒலிப் புணர்ச்சி பேச்சொலிகளை ஒலிக்கும்போது இடைத் தோன்றும் சிறு ஒலிகள் (Glides).

மெய்கள்—திராவிட மூதாதை மொழியின் மெய்யொலிகளுடன் அவற்றின் தொடர்பு, மெய்யொலிகளின் வரலாறு, அவற்றில் மாறுபாடு அண்ணமெய் ஆதல், பல் இன மெய் ஆதல், ஒலிப்புப் பெறுதல், ஒலிப்பு இழுத்தல், மெய்யொலி நீளம், ஒரினமாதல், ஒற்றளபெடை, மெய்யொலிகளின் புணர்ச்சி.

ஒலியசைகளின் அமைப்பு விதிகள்: இவ் விதிகளின் அமைப்பில் தொல்காப்பியத்திற்கும், நன்னூலுக்கும் உள்ள வேறுபாடு—அயன் மொழிச் சொற்களைக் கடன் வாங்குதலில் இவ் விதிகளின் செல்வாக்கு.

உறுப்பியல்: பழங்கால, இடைக்கால, இக்காலத் தமிழின் கீழ்க்கண்ட கூறுகளை வரலாற்று முறைப்படி ஆராய்தல்.

பெயர்கள் : மூவிடப் பெயர்கள் — வேற்றுமைகள்; வினைகள்—செயப்பாட்டு வினை—வினை நிலைகள் (Moods); ஏவல் முடியா நிலை (Infinitives), வரை நிலை (Subjunctive) காலங்காட்டும் வினைகள் அவை காலங்காட்டும் முறை, எதிர்மறை இனநிலை பெயரெச்ச, வினையெச்ச விகுதிகள்.

சொல் ஆக்கம் : எழுத்தமைவால் — தொகைச் சொற்கள் (உவமை உம்மை போன்ற தொகைகள்)—அடிச் சொற்களோடு பொருளசைகள் சேருவதால்—பகுதிகளை உண்டாக்குதல்—இரட்டைப் பகுதிகள் முதலியன.

சொற்கோவை (Vocabulary) : வெவ்வேறு காலங்களில் தமிழ் சொற்கோவையின் பொதுவியல்புகள்—கடன் வாங்கல், அதன் காரணங்கள், சொல்லாக்கத்தில் ஒன்றுப் பொருள், வேறுபாடு காட்டும் சொற்கள் (Doublets) தமிழில் தெலுங்கு, கன்னடச் சொற்கள், பழந் தமிழ்ச் சொற்கள் வழக்கொழிந்தமை—வடமொழிச் சொற்கலப்பின் இயல்பும் அளவும்—தற்சமம், தற்பவம் (இவை பற்றிய விதிகள்)—பிராகிருத மொழியிலிருந்து கடன் பெற்றவை (இந்தி, போர்த்துக்கல், ஆங்கிலம் ஆகியன) இரட்டைப் பிறவிச் சொற்கள் (Hybrids)—பிறமொழிச் சொற்களைக் கண்டறிய வழிகள்.

சொற் பொருளியல்: சொற் பொருளில் மாற்றம்: உயர் பொருட்பேறு, இழிப் பொருட்பேறு, சிறப்புப் பொருட்பேறு, பொதுப் பொருட்பேறு முதலிய வகைக

ளில் காலந்தோறும் சொற்களின் பொருள் மாறி வந்துள்ளமை.

தொடரியல்: சொற்றொடரில் சொற்கள் தொடரும் முறை பற்றி வரலாற்று முறைப்படி அறிதல்—இயல்பான தொடர்பு முறையினின்றும் வேறுபடும் இடங்கள், அதன் காரணங்கள். டாவுக்கும், உரைநடைக்கும் தொடர் முறையில் உள்ள வேறுபாடுகள்—தமிழ் சொற்றொடர் அமைப்பில் அயன் மொழிச் செல்வாக்கு.

(ஆ) திராவிட மொழிகளின் ஒப்பிலக்கணம் - பாடத்திட்டம்:

திராவிட மொழிகள்: திராவிடக் குடும்ப மொழிகளும் அவற்றின் முதன்மையான இயல்புகளும்—அம் மொழிகளின் எண்ணிக்கை.

திராவிட ஒலியியல்: திராவிட மூதாதை மொழி—உயிர் ஒலிகளின் நிரல்—மாறுபாடுகள்—ஒலியழுத்தம்—உயிரொலி இயைபு, மெய்யொலிகளின் நிரல் வளைநாவொலிகளின் பிறப்பிடம்—திராவிடக் குடும்ப மொழிகளிடையே மெய்யொலிகளின் புணர்ச்சி—மூக்கின் மெய்பெறல்—விட்டிசைத் தடுப்பு—திராவிட ஒலியசை அமைப்பு.

திசை மொழிகள் அல்லது கிளை மொழிகள்: செந்தமிழும் கொடுந்தமிழும்.

உறுப்பியல்:

1. பெயர்கள்: திணை, பால் பகுப்பு—உயர்திணைப் பெயர்களும் அஃறிணைப் பெயர்களும்; எண்: ஒருமையும் பன்மையும்—இருமை இன்மை—ஆண் ஒருமை, பெண் ஒருமை, அஃறிணை ஒருமை பன்மை—பன்மையாக்குவதற்கு விதிகள், வேற்றுமை. வேற்றுமை உருபுகளும் அவற்றை ஏற்கும் முறைகளும், திராவிட வேற்றுமைகளை வடமொழி வேற்றுமைகளுடன் ஒப்பிடல்.

2. மூவிடப் பெயர்கள்: தன்மை, முன்னிலை இடப் பெயர்கள்—திராவிடக் குடும்ப மொழிகளின் இப் பெயர்களை ஒப்பு நோக்கல், தற்சுட்டு இடப் பெயர் (Reflexive Pronoun) ஆகியவற்றின் பன்மை வடிவங்கள்—சுட்டுப் பெயர்கள்—அவற்றின் அடிச் சொற்கள் சுட்டு, வினாப் பெயரிடைகளும், வினையிடைகளும்—உயர்வு கருதிய சுட்டுப் பெயர்கள்.

3. வினைகள்: திராவிட வினைகளின் அமைப்பு—பெயராகவும், வினையாகவும் பொருள்படும் அடிச் சொற்கள்—அடிச் சொற்களுடன் பயிலச் சேர்க்கப்படும் பொருளசைகள் வினைவகை: காரண வினை—அமைப்பு இரட்டைக் கிளவி

வினை, கால இடை நிலை விகுதிகள் ஆகியவற்றை வினையடிச் சொல்லுடன் சேர்க்கும் முறை (Conjugational System)—காலங் காட்டும் வினைச் சொற்கள்— அவற்றின் சிறப்புப் பயனும்— நிகழ்காலம், இறந்த காலம், எதிர்காலம்—வினையெச்சமும், பெயரெச்சமும் வினை நிலைகளை உருவாக்குதல் (Formation of moods) வரை நிலை, ஏவல், முடியா நிலை, வினைகளை உருவாக்கும் முறைகள், கருத்தாவிற்கும் செயற்கும் உள்ள தொடர்பு, செய்வினை, செயப்பாட்டு வினைகள்—எதிர் மறை வினைகள்—எதிர்மறை இன நிலைகள்.

தொழிற் பெயர், வினையடிப் பெயர், பண்புப் பெயர் இவற்றின் தோற்றம்.

தொடரியல் ஒப்பு நோக்கு: திராவிடக் குடும்ப மொழிகளின் தொடர் இலக்கணங்களை ஒப்பு நோக்கல்— அதில் பிற மொழிச் செல்வாக்கின் அளவு.

பின் குறிப்பு: இவ் வினாத் தாளில் 100 மதிப்பெண்களும், தமிழ் மொழி வரலாற்றிற்கு 50 ஆகவும், திராவிட மொழி ஒப்பிலக்கணத்திற்கு 50 ஆகவும் வழங்கப் பெறும்.

பரிந்துரைக்கப்பெறும் நூல்கள்:

1. தமிழ் மொழி வரலாறு—கவிராச பண்டிதர் இராம சுப்பிரமணிய நாவலர்.
2. மொழி வரலாறு—டாக்டர் மு. வரதராசனார்.
3. மொழியியல்—இரா. சீனிவாசன்.
4. ஒப்பிலக்கணம்—புலவர் கோவிந்தன்.

தாள் 8: கல்வெட்டு.

பி. ஏ. (ஆனர்சு) வகுப்புக்கெனச் சென்னைப் பல்கலைக் கழகம் வெளியிட்டிருக்கும் கல்வெட்டுக்கள்.

Branch XII—(c) Specialised Course in Sanskrit and Tamil Grammar I (Tamil)

இலக்கணம் 1.

தொல்காப்பியம்: எழுத்ததிகாரம்—இளம்பூரணம்.

தொல்காப்பியம்: பொருளதிகாரம்—அகத்திணையியல்.

அகப்பொருள் விளக்கம்.

Syllabus for secod and third year will be prescribed later.

Branch XII—English

Social History of England from the Tudor period to the present day. The scope of the syllabus being indicated by Chapters IV to XVIII of Trevelyan's Social History of England, Indian Edition by Orient Longmans.

Novel and Drama

Shakespeare

Prose

Poetry

History of Literature and Literary Criticism.

Section A :

Literary Criticism carrying 40 marks and containing two questions on literary forms and literary criticism, the scope being indicated by Hudson's Introduction to the Study of Literature and Brander's Pleasures of Prose and Poetry.

Section B :

History of English Literature carrying 60 marks containing three questions (the scope being as shown below). The History of English Literature should be studied in outline with special emphasis on the following ten topics and twenty authors :

Topics	Authors
1. Renaissance	1. Spenser
2. Elizabethan Drama	2. Ben Johnson
3. Sonnets	3. Shakespeare
4. Metaphysical Poetry (Restoration Drama)	4. Milton
5. Periodical Essay	5. Dryden
6. 18th Century Novel	6. Addison
7. 18th Century Poetry	7. Pope
8. Romantic Revival	8. Dr. Johnson
9. 19th Century Novel	9. Goldsmith
10. Victorian Poets (Preraphaelities)	10. Wordsworth
	11. Coleridge

12. Keats
13. Shelley
14. Scott
15. Jane Austen
16. Tennyson
17. Arnold
18. Browning
19. Dickens
20. Thackeray.

Books Recommended for Study :

Hudson	:	Outline History of English Literature
Rees	:	An Introduction to the Study of Literature
Sampson	:	Concise History of English Literature
Scott James	:	Fifty Years of English Literature
David Daiches	:	A Critical History of English Literature (Two Volumes)

(42)

Branch XIII—Indian Culture

Group A

Outlines of Indian Philosophy

1. The Vedas—Religious ideas and Rituals—The idea of God and Philosophical concepts.

2. The Upanishads, Central teaching — Ontology. Concepts of Brahman — Atman. Cosmology. 2 Views : Nisprapancha (Cosmic) and Saprapancha (Acosmic). Eschatology : Atman (Soul) — its nature and destiny.

3. The Bhagavad Gita — Idea of God — Spiritual disciplines.

4. Rise of the systems : Non-Vedic and Vedic.

5. Indian Materialism : Charvaka.

6. Jainism : Syadvada, Categories Soul its nature and destiny.

7. Buddhism : Philosophical implications. Kshanika Vada and Anatma Vada. The Four Noble Truths Ethics Conception of Nirvana and Mahayana and Hinayana.

8. Nyaya-Vaiseshika : Pramanas, Categories, Theories of Causation. Asatkarya Vada—Atomism God : Soul and its destiny.

9. Sankhya — Yoga. Prakriti and Purusha. Satkarya Vada Theory of Evolution. Eight limbs of Yoga. Idea of God.

10. Purva Mimamsa, Authority of the Vedas and the concepts of Dharma, Apurva and Adhrista.

11. Schools of Vedanta :

(*a*) Advaita : Absolute and God. Doctrine of Maya—Avidya, Vivartha Vada. Jiva. The doctrine of non-difference Means of Moksha. Jivanmukti.

(*b*) Visishtadvaita : Distinction from Advaita. Nature of Brahman. Jiva and Prapancha, Ethics, religion and moksha.

(*c*) Dvaita : Nature of God, Soul and matter, Ethics and religion.

(*d*) Saiva Siddhanta : God, Soul and matter ; the theory of malas. Stages in spiritual growth.

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2. M. Hiriyana : Essentials of Indian Philosophy.
3. Datta and Chatterjee : Introduction to Indian Philosophy.
4. S. Radhakrishnan (Editor) : History of Philosophy — Eastern and Western Vol. 1 Relevant Chapters.
5. P. N. Srinivasachari : The Ethical Philosophy of the Gita.
6. Dr. V. A. Devasenapathy : Saiva Siddhanta.
7. Dr. T. M. P. Mahadevan : Outlines of Hinduism.
8. S. Kuppuswamy Sastri : Indian Logic.
9. Dr. Jadunath Sinha : Sinha Publishing House Private Ltd. 36, S. R. Das Road, Calcutta - 12.
10. இந்திய தத்துவ ஞானம் — கி. லட்சுமணன்.

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Principles of Saivam and Vaishnavism.

1. Traces of Saivam : In the Vedas, the idea of Rudra-Pasupathi, development of Saivam in the Upanishads, especially Svetasvatara, Pratyabhijha and Virasaivam, Schools of Saivam, listed as inner and innermost in Saiva Siddhanta.

2. Samayakuravars and Santhana acharyas : Thothiram and Sathiram works. Thothiram — 12 Thirumurais — Study of 100 selected verses. Thirumandiram — fourteen Meikandar's Sathiras (scriptures). Study of Sivagnanabothanam (Text only).

3. Siddhanta — Pramanaiyal — (Epistemology) Number of Pramanas, nature of truth, Theory of error.

Metaphysics (Ontology) :

Pati : Proofs for existence, nature of Pati, Siva and Sakthi (Grace).

Pasu : Proofs for existence
Plurality of souls : nature of souls, statues of soul.

Pasa : Anava, Kanma and Maya, Cosmology—36 tattvas : Scheme of evolution.

4. Four Sadhanas (Ethics and Religion) : Means of attaining salvation ; Carya Kriya, Yoga and janana : diksha. Significance of iruvinaioppu — Malaparipaham — Sakhinipatham—Nature of release Jivanmukthi — Comparison with the Concept of release in other darsnas.

Saiva Agamas :

Vedas and Agamas — Their relationship. Kinds, Number and their chronology. Topics discussed in the Agamas — Agamic rituals connected with temple worship.

Books for reference :

1. V. A. Devasenapathi : Saiva Siddhanta (University of Madras).

2. V. Paranjothi : Saiva Siddhanta (C.L.S. Madras).

3. J. H. Piet, 1952 (C.L.S.) Madras. A Logical Presentation of the Saiva Siddhanta Philosophy.

4. J. M. Nallaswamy Pillai, (1911) : Studies in Saiva Siddhanta (Meykandan Press, Madras).

5. V. Ponnaiah (1952) : The Saiva Siddhanta Theory of Knowledge. (The Annamalai University).

6. (Annamalai University) : Collected Special Lectures on Saiva Siddhanta.

7. C. V. Narayana Iyer : Saivism in South India.

8. C. V. Narayana Iyer : A History of Saivism.

9. Dr. Durai Arangaswami : Religion and Philosophy o Thevaram with special reference to Sundarar.

10. Bhandarkar : Vaishnavism, Saivism, etc.

11. மாணிக்கவாசகர்—வரலாறும் காலமும் (முதற் பகுதி)—மறைமலையடிகள் : (கழக வெளியீடு).

12. இலஞ்சி எ. சொக்கலிங்கம் : ஆலயங்களின் உட்பொருள் விளக்கம் (2 பகுதிகள்).

13. ஆறுமுக நாவலர் : இந்துமத இணைப்பு விளக்கம் :

14. ம. பொ. சி. : வள்ளலார்கண்ட ஒருமைப்பாடு :

15. N. B. Utigikar : Vaishnavism, Saivism and Minor Religious system.

16. ப. இராமநாத பிள்ளை : சித்தியார் ஆராய்ச்சி.

17. மறைமலையடிகள் : சிவஞான போத ஆராய்ச்சி.

18. கா. சு. பிள்ளை : மெய்கண்டரும் சிவஞான போதமும்.

19. தவத்திரு மாணிக்கவாசக ஞான தேசிக சுவாமிகள்: சிவஞானபோத விளக்கம்.

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2. Selections on Saivism in the Bahratiya Vidya Bhavan, Volume-I —The Vedic Age.

3. Philosophy of Saivism in "The Cultural Heritage of India" —Volume" IV. (The Ramakrishna Mission Institute of Culture, Calcutta).

Note :— Questions on religious and philosophical aspects alone should be asked on these selected verses and not the literary aspects, grammatical peculiarities annotations, etc. 10 marks will be set apart for the questions on Study of Selected Thothiram and Sathiram works.

பன்னிரு திருமுறை பாடற்றிரட்டு

1. குருவருள் பெற்றது

ஞானசம்பந்தர் "தோடுடைய செவியன்"—பதிகம் 1.

திருநாவுக்கரசர் ''கூற்றுயினவாறு''—பதிகம் 1.
சுந்தரர் ''பித்தா பிறைசூடி''—பதிகம் 1.

2. திருநாவுக்கரசர் — போற்றித் திருத்தாண்டகம்—தேவாரம்.

''கற்றவர்கள் உண்ணும் கனியே''—பாடல் 1.

''பிரமன் தன் சிரமரிந்த பெரியோய்''—பாடல் 1.

''ஒருவனுய் உலகேத்த''—பாடல் 1.

''ஈசனுய் உலகேழும்''—பாடல் 1.

''உயிராவன மிகுந்து உற்று நோக்கி''—பாடல் 1 திருவாரூர்.

''பற்றி நின்ற பாவங்கள்''—பாடல் 1.

''நிலைபெறுமாறு எண்ணுதியேல்''—பாடல் 1.

''எவரேனும் தாமாக''—பாடல் 1. திருக்கன்றுப்பூர்.

தனித் திருத் தாண்டகம்—

''நாற்பதத்தார் நற்பதமே''—பாடல் 1.

''ஆட்டுவித்தால் ஆரொருவர் ஆடாதாரே''—பாடல் 1.

நின்ற திருத்தாண்டகம்—

''இரு நிலனுய் தியாகி''—பாடல் 1.

மறுமாற்றத் திருத்தாண்டகம்—

''நாமார்க்கும் குடியல்லோம்''—பாடல் 1.

திருவினுத் திருத்தாண்டகம்—

''மைப் படிந்த கண்ணுள்''—பாடல் 1.

கோவில் திருவிருத்தம்—

''குனித்த புருவமும்''—பாடல் 1.

''முன்னம் அவன் நாமம் கேட்டான்''—பாடல் 1—திருவாரூர்.

3. திருஞானசம்பந்தர் தேவாரம்—

''புலனைந்தும் பொறி கலங்கி''—பாடல் 1—திருவையாறு.

வினு விடை: திருக்கண்டியூர், விரட்டம்.

''வினவினேன் அறியாமையில்''—பாடல் 1.

''மன்னில் நல்ல வண்ணம் வாழலாம்''—பாடல் 1 திருப்பரமபுரம்.

''போதையார் பொற்கிண்ணம்''—பாடல் 1.

''காதலாகி''—பாடல் 1—நமச்சிவாயப் பதிகம்.

4. சுந்தர தேவாரம்—

''தம்மையே புகழ்ந்து இச்சை பேசினும்''—பாடல் 1—திருப்புகலூர்.

''மற்று பற்றெனக் கின்றி''—பாடல் 1—திருப் பாண்டிக்கொடிமுடி.

''மலையார் அருவித்திரள்''—பாடல் 1—திருத் துறையூர்.

5. திருவாசகம் :

பிடித்த பத்து—

''உம்பர்கட்கரசே''—பாடல் 1.

அருட் பத்து—

''ஜோதியே சுடரே''—பாடல் 1.

யாத்திரைப் பத்து—

''பூவார் சென்னி''—பாடல் 1.

வாழாப் பத்து—

''பாரொடு விண்ணய்''—பாடல் 1.

கோத்தும்பி—

''பூவேறு கோனும்''—பாடல் 1.

திருச்சதகம் 2வது பதம்—அறிவுறுத்தல்.

திருவெம்பாவை முழுவதும்.

குழைத்த பத்து—

''அன்றே என் தன் ஆருயும்''—பாடல் 1.

திருச்சதகம்—

''வாணுகி மன்ணுகி''—பாடல் 1.

6. திருவிசைப்பா—

இராஜராஜேசுரம் தஞ்சை கரூர்த்தேவர் பதிகம்.

''உலகெலாம் தொழவந்து''—ஒரு பதிகம்.

திருவாலி அமுதனர் கோயில்: தஞ்சை.

''பவளமால் வரை''—பதிகம் கோயில் பதிகம் 1.

7. 11 திருமுறை—

நக்கீர தேவ நாயனர்—

''கார் எட்டு''—பாடல் 8.

சேரமான் பெருமாள்—

''திருக் கைலாய ஞான உலா''

1.58 கண்ணிகல்.

8. பெரிய புராணம்—

திருநாவுக்கரசர் புராணம்—தில்லை தரிசனம் செய்யுள் 156—166 வரை.

அப்பூதியடிகளைக் கண்டு மகிழ்தல்—பாடல் 199—209வரை.

Principles of Vainavam

Origin of Vainavam :

Traces of Vainavam in the Vedas : Its development in the Upanishads like the Mahanarayana Upanishads, Brahma Sutras, and the Bhagavat Gita, Vishnu purana. The Bagavata, Pancharatra Vainavam in Tamil Literature, Sangam literature and the Alvars.

Nalayira Divya Prabhandam with special reference to Nammalvar's Thiruvaymoli.

Study of 110 stanzas from the Nalayira Divya Prabhandam Contribution of Ramanuja Vedanta Desika Pillai Lokacharya.

Epistemology :

Number of pramanas : The equal validity of all Vedic texts.

Ubaya Vedanta Nature of truth : Theory of Error.

Tatva Traya (Ontology) :

Meaning of Visistadvaita : Brahman cause of Cosmic evolution Cosmology — The doctrine of aprathksiddhavisisana — Brahman cit and acit — Categories and their characteristics — meaning of aprakttra and time.

Jiva :

As an entity persisting through the four states of waking, dream, sleep, and release — darmabhutajna — Jiva as anu, not vibu.

Ethics and Religion :

Moral freedom of the finite self — Karma, Krupa-Karma as Yoga or worship of God without desire for fruits — service as supreme good— Sariri — Sarira — sambandha — Karma — Jnana Bhakti and Prapathi — Alvars : nature of Mukti.

Comparison with the concept of release in other dharsanas.

Books for reference :

1. P. N. Srinivasachari : Philosophy of Visistadvaita.
2. M. Yamunacharya : Ramanuja's teachings in his own words.
3. M. R. Rajagopal Ayangar : Rahasyatrya.
4. M. R. Rajagopal Ayangar : Vedantha Sangraha.
5. S. Krishnaswami Iyengar : History of South Indian Vaishnavism.
6. Bhandarkar : Vaishnavism, Saivism etc.
7. J. R. A. S. 1911 — Article on Pancaratra.
8. J. O. I. Tirupati — Schrader's article on Pancharatra.
9. N. M. Srinivasachari : Advaita and Visistadvaita.
10. இராமானுஜர்: பி. ஸ்ரீ.
11. Dr. Daniel Smith : Pancharathra (financed by Varadarajaswami Temple and Kanchi Kamakshi Pitha).
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14. Swami Adhidevananda : Yathindramatha Dhibika.
15. 'Life of Ramanuja' published by Sri Ramakrishna Mutt, Madras.

Note :— Questions on religious and philosophical aspects alone should be asked on Nalayira Divya Prabhandam, and not on their literary aspects, grammatical peculiarities, annotations etc. 10 marks will be set apart for the question on Study of selected Thothiram and Sathiram works.

Seleted Verses in Nalayira Divya Prabhandam

பெரியாழ்வார்

பல்லாண்டு	—1
மூன்றெழுத்ததனை	—4—7—10
துப்புடையாரையடைவதெல்லாம்	—4—10—1
பொன்னைக் கொண்டுரை	—5—4—5

ஆண்டாள்—
திருப்பாவை —1—30

குலசேகராழ்வார்—
இருளியச் சுடர்மணிகள் 1—1
ஆனுத செல்வத்து அரம்பையர்கள் 4—2
வித்துவ கோட்டம்மான் 1—10

தொண்டரடிப்பொடி ஆழ்வார்—
பச்சை மாமலை போல் திருமலை —2
குடதிசை முடியை —19

மதுரகவியாழ்வார்—
நாவினுல் நவிற்றி —2
நன்மையால் —4

திருப்பாணுழ்வார்—
அமலனுதி —5

திருமங்கையாழ்வார்—
குலந்தரும் செல்வம் 1—1—9
இனைப்பினை இயக்கம் நீக்கி
திருக்குறுந் தாண்டகம்
பாருகுவில் நீர் எரிசால்—
திருநெடுந்தாண்டகம் —2

பொய்கையாழ்வார்—முதல் திருவந்தாதி
வையம் தகழியாய் —1
அவரவர் தாம் தாம் —14
இமையாத கண்ணுல் —32
தமருகந்தது எவ்வுருவம் —44
ஏற்றுன் புள்ளூர்ந்தான் —74

பூதத்தாழ்வார்—இரண்டாம் திருவந்தாதி
அன்பே தகழியாய் —1

பேயாழ்வார்—மூன்றும் திருவந்தாதி
திருக்கண்டேன் —1
தாழ்சடையும் நீள் முடியும் —63

திருமழிசையாழ்வார்—நான்காம் திருவந்தாதி
வித்துமிடல் வேண்டும் —23

நம்மாழ்வார்— திருவிருத்தம்

பொய் நின்ற ஞானமும்	—1
வணங்கி நின்ற துறைகள்	—98

திருவாய்மொழி

உயர்வற உயர்நலம்	—1—11
ஆணல்லன்	2—5—10
யாவையும் யாவரும்	3—4—10
வம்மின் புலவீர்	3—9—6
காண்கின்ற நிலமெல்லாம்	5—6—3
உண்ணும் சோறு	6—7—1

கம்பர்—

உலகம் யாவையும் (பால காண்டம்)	—1
வானின்றிழிந்து (அயோத்தி)	—1
பேதியாதுநிமி (ஆரண்யம்)	—1
தாய் தன்னை அறியாத (ஆரண்யம்—விராதன பதை படலம்)	—1
மூன்றுரு என (கிட்கிந்தை)	—1
அலங்கலில் தோன்றும் (சுந்தரம்)	—1
ஒன்றே எண்ணின் (யுத்தம்)	—1
சானிலும் உளன் (இரணியன் வதை படலம்)	—1

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History of Indian Culture

(*Key-note :* Unity in diversity ; synthesis of various cultures ; genius for assimilation and tolerance).

1. Definition of Culture, Civilization and History and their inter-relationship.

2. Geographical background of Indian culture.

3. Harappa Culture (Indus Valley).

4. Vedic Culture.

5. Epic and Puranic Culture.

6. Social life in Ancient India (North and South).

7. Social and Cultural life in Tolkappiyam and Sangam Age — Maurya, Kushan, Sathavahana, Andhra, Ikshavaku, Gupta, Kalabhra, inter segnum, Chalukya, Pallava, Chera, Chola, Pandiya, Vijayanagara, Delhi Sultanate, Mughal Empire, Nayaks (Madurai and Tanjore) and Maratha periods.

8. Contribution of Religions in India to Indian Culture.

9. Cultural Renaissance in the 18th, 19th and the 20th Centuries in North and South India.

10. Contribution of Fine Arts in India to Indian Culture.

11. The Impact of West in India.

12. The Impact of India on the world with special reference to the Gandhiyan gospel of Satya, Ahimsa and Sarvodaya.

Indian culture with special reference to Tamil Nad :

13. Genius of Tamil Language.

14. Muttamil.

15. Tamil Way of Life as revealed in Tholkappiyam.

16. Key Concept of Aham and Puram in the ancient Tamil Literature.

17. Frontiers of Ancient Tamil Nad.

18. Maritime contacts of South India.

19. Characteristics of Sangam Literature.

20. Reverence for Life in the Kural.

21. Concepts of Religion in Sangam Literature and later devotional Literature.

22. Literature in Epigraphy.

Books for reference :

1. A. L. Basham : The wonder that was India.

2. G. T. Garrat (Ed.): The Legacy of India.

3. Humayun Kabir : Our Heritage

4. C. S. Venkateswara : Indian Culture through the Ages.

5. Dr. V. Raghavan : The Indian Heritage.

6. Max Muller : Heritage of India.

7. Hari Rao : History of Indian Culture.

8. Bharathiya Vidya Bhavan Volume 1-6 (relevant chapters).

9. பண்டைத் தமிழர் இன்பியல் வாழ்க்கை: இளவழகனார்.

10. பண்டைத் தமிழர் பொருளியல் வாழ்க்கை : இளவழகனார்.

11. Aurobindo : Foundation of Indian Culture.

12. Acharya Prasanna Kumar : Glories of India or Indian Culture and Civilization.

13. Sudarsanam M. J. : History of Indian Culture.

14. Mukerjee Radhakamal : Culture and Art of India.

15. Radhakamal Mukerjee : Hindu Civilization.

16. Lunia, B. N.: Evolution of Indian Culture from the earliest times to the present day.

17. Latif, Syed Abdul : Outline of the Cultural History of India.

18. Abdulla Yusuf Ali : India and Europe.

19. Barnett, L.D. : Antiquities of India.

20. Joad, C.E.M. : The Story of Indian Civilization.

21. Sarkar Jadunath : India through the Ages.

22. Macnicol, Nicoll : The making of modern India.

23. Max Muller : India.

24. Narendranath Law : Studies in Indian History and Culture.

25. Nehru, J. : Discovery of India.

26. O'Malley (L.S.S.) : Modern India and the West.

27. Rawlinson, M.G. : India a short Cultural History.

28. Sharma Sripad : Our heritage and its significance.

29. Shoshee Chandra Dutt : India, Past and Present.

30. Venkateswara, S.V. : Indian Culture through the Ages.

31. Percy Brown : Indian Agriculture.

32. Purguson and Havell Dubroi : Dravidian Architecture.

33. Fredric : Indian Temples and Sculpture.

34. Gopinatha Rao : Hindu Gods and Goddesses.

35. T. R. Sesha Iyengar : Dravidian India.

36. Kanakasabai Pillai : Tamils 1800 years ago.

37. S. K. Iyengar : Contribution of South India to Indian Culture.

38. Prof. T. P. Meenakshisundaram Pillai : History of Tamil Language.

39. Prof. T. P. Meenakshisundaram Pillai : History of Tamil Literature.

40. K. G. Sesha Iyer : Seral Kings of the Sangam period.

41. K. A. Neelakanta Sastri : The Cholas. (Parts I and II).

42. P. T. Srinivasa Iyengar : Pre-Aryan Culture of the Early Tamils.

43. P. T. Srinivasa Iyengar : History of the Tamils.

44. Gilbert Slater : Dravidian Elements in Indian Culture.

45. Dr. K. K. Pillai : A History of South India. I and II.

46. K. A. N. Sastri : History of South India.

47. Publication Division, Govt. of India : Contribution of the South to the heritage of India.

48. K. A. Neelakanta Sastri : The Pandiya Kingdom.

49. Prof. T. P. Meenakshisundaram Pillai : Collected works.

50. S. K. Iyengar : Collected works (2 volumes).

51. K. M. Panikar : Geographical factors that have influenced India.

52. K. M. Panikar : Essentials of Indian Culture.

53. Albert Schwitzer : Indian Thought and its Development.

54. C. P. Ramaswami Iyer : Phases of Indian Culture.

54. A. Pushalkar : Epics and Puranas. (Bharatiya Vidya Bhavan).

56. R. Gopalan : History of Pallavas of Kanchi.

57. C. Meenakshi : Administration and Social Life under the Pallavas.

FINE ARTS

Including Temple Architecture, Painting, Sculpture, Music and Econography

I. Fine Arts :

Definitions — Various branches of Fine Arts. Architecture, Sculpture, Bronze, Painting, Music and Dance — Their inter-dependence — Indian Art Uniquenous of Indian Art — Its vision, form and composition — Traditions and Ideals of Indian Art. (60 Hours)

Books recommended :

1. Coomaraswamy, A.K. : Aims of Indian Art.
2. Coomaraswamy, A.K. : Why exhibit Art ?
3. Coomaraswamy, A.K. : Dance of Siva.
4. Coomaraswamy, A.K. : History of Indian and Indonesian Art.
5. Stella Kramrisch : The Art of India.
6. Radhakamal Mukerjee : Cosmic Art of India.
7. Bharatha Iyer, K. : Indian Art.
8. Mulk Raj Anand : Hindu View of Art.
9. Das Gupta : Fundamentals of Indian Art.
10. Herbert Read : The Meaning of Art.
11. Somasundaram, J.N. : சிற்பமும், கலைவாழ்வமும்
12. Ramachandran, T.N. : Golden Age of Indo-Javanese Art. (2nd edition).

II. Temple Architecture :

Evolution of Hindu Temples — Dravidian, Nagara and Vesara styles — Architecture of various periods — Indus Valley — Vedic — Mauriyan — Sunga — Sathavahana — Buddhist Chaitya halls and Viharas — Gandhara — Gupta Chalukyan — Rastrakuta — Pallava — Chola — Pandya — Vinayagar — Later Madurai style — Hoysala — Orissan — Khajuraho — Rajaputana — Gujarat — Bengal. (60 Hours)

Books Recommended :

1. Percy Brown : Indian Architecture.—Buddhist and Hindu.

2. Ferguson, J. : History of Indian and Eastern Culture.

3. Lewis Fredric : Indian Temples and Sculpture.

4. Gupte, R.S. and Mahajan, B.D. : Ajanta and Ellora.

5. Havell, E.B. : Indian Architecture.

6. Rowland, Benjamin : The Art and Architecture of India.

7. Smith, V.A. : A History of Fine Arts in India and Ceylon.

8. Gangoly, O.C. and Coswami, A. : The Art of Pallavas.

9. Balasubramaniam, S.R. : Early Chola Art.

10. Stella Kramrisch : The Hindu Temple.

11. Zimmer, Heinrich : The Art of Indian Asia.

12. Somasundaram, J.M. : தில்லைச் சிற்றம்பலவன் கோயில்

13. Somasundaram, J.M. : சோழன் கோயில் பணிகள் and his other works.

14. Sinivasan, K.R. : Pallava Cave Temples. (Govt. of India Publication).

15. Ramachandran, T.N. : 3 Styles of Temple Architecture.

16. Ramachandran, T.N. : Thiruparuthikuntram Temple.

17. Ramachandran, T.N. : Nagarjunakonda 1938.

III. Sculpture :

Mauryan — Sunga — Sathavahana — Ikshavaku — Gandhara — Gupta — Pallava — Chola — Rastrakuda — Chalukya — Hoysala — Pandiya — Vijayanagara — Orissan. (Eastern Gauge) Nayaks.

Books Recommended :

1. Ramachandran, T.N. : The Great Temple of Tanjore — Its Sculpture and Painting (Govt. of India Publication).
2. Ramachandran, T.N. : Arjuna's Penance in Art (Society of Indian Art or Oriental Art.)
3. Saraswathi, S.K. : A Survey of Indian Sculpture.
4. Goswami, A. Ed. : Indian Temple and Sculpture.
5. Sivaramamurti, C. : Indian Sculpture.
6. Chintamoni-Kar : Classical Indian Sculpture.
7. Douglass Barret : Sculptures from Amaravati in the British Museum.
8. Sir John Marshall : The Buddhist Art of Gandharva.

IV. Iconography :

Definition — Sources — Origin and development of Image worship in India — Accessories and Ornaments of Hindu Images — Images of Gods and Goddesses.

Books recommended :

1. Gopinatha Rao, T. A. : Elements of Hindu Iconography.
2. Jitandra Nath Banerjee : The development of Hindu Iconography.
3. Thapar, D. R. : Iconsin Bronze.
4. Ramachandran, T.N.: Hindu Metal Images. (Madras Museum)
5. Sivaramamurthi, C. : South Indian Bronze. (Lalitha Kala Academy).

V. Painting :

Sadanga of Indian Painting—Buddhist frescoes at Ajanta and Bagh-Pallava Paintings at Sittannavasal — Chola Paintings at Tanjore—Vijayanagara Paintings — Mughal Paintings — Rajput Paintings.

(30 Hours)

Books recommended :

1. Percy Brown : Indian Paintings.
2. Stella Kramrisch : A survey of Paintings in the Deccan.
3. Coomaraswamy, A. K. : Rajput Painting.
4. Ramachandran, T.N. : Sittannavasal (Lalitha Kala Academy).

Relevant articles from various magazines and books may be consulted.

VI. *Music :*

Features of Music — Its Primary position in Fine Arts — Its relation to Religion and Temple — A medium to serve culture — Fundamental differences between Indian and Western Music and between Hindustani and Carnatic Music — Tamil Isai and its place in culture and Temple worship — Temple Ritual music and musical instruments — Devotional Music in Tamilnad — Composers thereof — Classical, Mediaeval and Modern — Thyagaraja — Shyma Sastri — Muthuswamy Dikshitar — Swati Thirunal — Jayadeva — Purandara Dasa —Kshetrajna — Gopalakrishna Bharathiyar — Papanasam Sivan, Vedanayakam Pillai — Musical Instruments.

Books recommended :

1. Prof. Sambamurthi, P. : Great Composers Vol. 1 and 2.
2. Popely, H.A. : The Music of India.
3. Goswamy, G. : The Story of Indian Music.
4. Premaladha, V. : Tamil Isai.
5. Ramachandran, T.N. : Sarangapaniswami Temple and its dance Karanas.
6. தண்டபாணி தேசிகர்—தமிழ் இசைக் கட்டுரைகள்
7. க. பொன்னையா பிள்ளை—இசையியல்.
8. கு. கோதண்டபாணி பிள்ளை—பழந் தமிழ் இசை.
9. மயிலை சீனி வேங்கடசாமி — தமிழர் வளர்த்த அழகுக் கலைகள்.
10. சுவாமி விபுலானந்த அடிகள்—யாழ் நூல்கள்.
11. ஆபிரகாம் பண்டிதர்—கருணாமிருத சாகரம் தொகுதி 1 & 2.

B. A.

Part III

Group — B — Ancillary Subjects
(Ancillaries)

Branch I — History Main
(Ancillaries)

1. Politics : Political Theory including a text — Syllabus same as for Branch II — Politics Main (Vide syllabus No. 12).

2. Modern Governments : Syllabus same as for Branch II — Politics Main (Vide syllabus No. 14).

3. General Economics : Syllabus same as for Branch III *(a)* Social Science Main (Vide syllabus No. 24).

(46 A)

GENERAL GEOGRAPHY OF THE WORLD

Part A

Geography of India :

1. *(a)* Location and size — Frontiers — Space relations — Structure and Relief — Drainage — Climate — Natural Vegetation —Soils.

(b) Agriculture and Irrigation.

(c) Minerals and power resources — Industries — Live-stock and fisheries.

(d) Trade and trade centres — Transport.

(e) Population — Growth and distribution.

Part B

Geography of the World :

2. General study of Asia, Europe and North America :—

Discoveries, explorations and expeditions.

Physical setting — Structure and relief — Drainage — Natural Vegetation.

Study of the following regions :—

Asia : South East Asia, South West Asia, China and Japan.

Europe : Fenno Scandinavia, United Kingdom, France, Low Countries Central Europe, Mediterranean Europe, U.S.S.R.

North America : Canada and United States of America.

3. Southern Continents.

Comparative study of Relief and structure — Drainage Climate Natural Vegetation — Agriculture — Mining and manufacturing Pastoral industries — Trade and Transport — Population (growth and Distribution).

Reference :

Rao, B. S. : Industries of India Vols. I and II.

Kuriyan, G. : India, A general Survey. (National Book Trust, India).

Government of India : Five Year Plans.

Government of India : Census of India Volumes 1961.

Dubey and Negi : Economic Geography of India.

Das Gupta : Economic and Commercial Geography.

Randava : Agriculture and Animal Husbandry in India.

Government of India : The Gazetteer of India, Vol. I Country and People (publications Division, Ministry of Information Broadcasting 1965).

Preece and Wood : Europe.

Shackleton : Europe.

Cressey : Asia, Lands and Peoples.

Stamp : Asia.

Trewartha : Japan.

Suggate : Africa.

Suggate : Australia.

Money, D.C. : South America.

Sharahan : South America.

Rodweel Jones : North America.

Stamp and Beaver : British Isles.

Spencer : Asia — East by South.

Dobby : South East Asia.

Coysh and Tomlison : The Southern Continents.

Sharof : A short history of Geographical discovery.

Fisher, W. B. : The Middle East.

Lavenishchew, A. : Economic Geography of the U.S.S.R.

PRINCIPLES OF HUMAN GEOGRAPHY

MAIN

1. Scope of human geography. Determinism vs. Possibilism.

2. Population and settlements (Detailed study).

   (*a*) Distribution of Man.

   (i) On the basis of cultural elements — Race, language and religion — Group contacts and consequences.

   (ii) On the basis of total numbers — Theories.

   (*b*) Patterns of distribution (Grouping).

   Settlement Patterns.

   Population Trends — Growth of Population — The different theories.

   (*c*) Population Movements, past and present.

3. Mode of life (Systematic Treatment).
   Culture and Civilisation — Levels of Culture — The concept of sequent occupance.

Note : Mode of life to be studied in relation to the levels of culture discussing in detail the different elements ; House types, dress food habits ; arts and crafts, manners and customs, and rhythm of life.

Reference Books :

Brunhes : Human Geography.

Vidal de la Blache : Principles of Human Geography.

Daryll Forde : Habitat, Economy and Society.

Huntington : Human Habitat and Main springs of Civilisation.

Huntington : Principles of Human Geography.

Semple : Influence of Geographic environment.

Benn : Foundations of Human Geography.

Markham : Climate and Energy of Nations.

Moodie : Principles of Human Geography.

Carr Saunders : Population Problems.

Chandrasekhar : Population and Food Supply.

Boas : Race, Language and Culture (Macmillan).

Thompson : Population Problems (McGraw Hill).

(46 C)

REGIONAL GEOGRAPHY OF THE WORLD AND INDIA

(*a*) Regional Geography of the world.

Part I — General Study of Asia, Europe and North America

Discoveries, Expeditions, Explorations.

Structure and Relief — Climate — Soils and Vegetation — Agriculture and Industries — Trade and Ttansport.

Population — Natural Regions.

Part II — A Comparative study of the Southern Continents :

(*b*) Regional Geography of India.
(India Denotes Union of India).

I. Physical Setting Resources :

Space Relations.
Structure, Relief and Drainage.
Climate, Rainfall in relation to famine and irrigation.
Natural vegetation and Soil.
Mineral Resources and Production.

II. Cultural Features :

Population .
Agriculture.
Animal Husbandry and Fishing.
Manufacturing.
Communications and Trade.

III. Regional Study :

Study of the Natural Regions of India.

Books for Reference :

Lyde : Continent of Asia.

Lyde : Continent of Europe.

Rodwell Jones : North America.

Cressey, G.B. : Foundations of China.

Cressey, G.B. : Asia, Lands and Peoples.

Fitzgerald : Africa.

Stamp : Africa.

Gregory and Shave : U. S. S. R.

Stamp : Asia.

Spare : India and Pakistan.

Huntington and Valkenburg : Europe.

Unstead : World Survey.

Chackleton : Europe.

Shanahan : South America.

Griffith Taylor : Australia.

Suggate : Australia.

Stamp and Beaver : British Isles.

Trewartha : Japan.

Government of India : First Five-Year Plan.

Government of India : Progress Report of First Five Year Plan.

Branch II — Politics

(Ancillaries)

History of Greece and Rome upto 395 A.D.
(Syllabus same as for Br. I—History main — vide. syllabus No. 3.)

History of Europe from 395 A.D. to 1500.
(Syllabus same as for Br. I — History main — vide syllabus No. 4).

History of Europe from 1500 to the present day.
(Syllabus same as for Br. I — History main — vide syllabus No. 8.).

Political and Constitutional History of England upto 1603 A.D.

(Syllabus same as for Br. I — History main — vide. syllabus No. 10).

Political and constitutional History of England from 1603 A.D. to the present day.

(Syllabus same as for Br. I — History main — vide. syllabus No. 11).

History of America since 1776 A.D.

(Syllabus same as for Br. I — History main — vide. syllabus No. 6).

General Psychology.

(Syllabus same as for Br. III (*a*) Social Sciences main — vide. syllabus No. 22).

General Economics.

(Syllabus same as for Br. III (*a*) Social Sciences main vide. syllabus No. 24).

Branch III (*a*) —Social Sciences Main

No ancillary.

Branch III (*b*)—Sociology Main

(Ancillaries)

Indian Economic Problems.

(Syllabus same as for Br. IV — Economics main— vide. syllabus No. 32).

Histoty of Indian Culture.

(Syllabus same as for Br. XIII — Indian Culture — vide. syllabus No. 44.)

Branch IV—Economics Main

(Ancillaries)

(47)

Elements of Economic Statistics : (Compulsory)

Syllabus : (Derivation of Formulae is not expected in this course).

1. *Introduction* : Meaning and definition of Statistics — Scope, uses, importance and limitations of Statistics — role of statistical methods in other fields with special reference to Economics — Planning and conducting a statistical enquiry — Collection of data.

2. *Presentation of data :* Different types of graphs and diagrams classification and tabulation.

3. *Measures of Central Tendency :* Mean, Median, Mode, Geometric Mean and Harmonic Mean (Weighted and Simple) — Relative advantages and disadvantages.

4. *Measures of dispersion :* Standard deviation, Quartile, deviation, Deciles — Coefficient of Variation.

5. *Association of attributes :* Correlation, co-efficient of correlation and its interpretation — Regression lines and their application.

6. *Regression and Ration of Variation :* Relationship with elasticity.

7. *Index numbers :* Method of construction of a price index number — selection of items — selection of base (Fixed base and chain base) — selection of average-selection weihgts.

Tests of Consistency for an index number :

Commodity, time and factor reversal tests—conversion of bases — Shifting base preiods — defating—Cost of living Index : Limitation of index numbers.

8. *Time Series Trend :* Method of measuring it — Free hand curve, Moving Averages and Method of Least Squares — Short time oscillations : Regular and Randum — Application to Business Forecasting.

9. *Indian Statistics :* Scope, Limitations and Criticisms — Population Statistics — Agricultural Statistics — Price Statistics — Trade Statistics — Wage Statistics — Industrial Statistics — National Sample Surveys — National Income.

10. *Elementary ideas of Probability :* Descriptive account of binomial and normal distribution — importance of these distributions.

Books Recommended :

Asthana, B.N. : Elements of Statistics.

Radhakrishnan, K. P. : Elements of Statistics.

Allen, R. G. D. : Statistics for Economics.

History of India —Paper II.

(Syllabus same as for Br. I — History Main — vide syllabus No. 2.)

Modern Governments.

(Syllabus same as for Br. II — Politics Main — vide syllabus No. 14).

(48)

Principles of Commerce

Economic basis of Commerce — Types of Business Organisation — Sole Trader — Partnership — Partnership Act — Duties, Rights and Liabilities of Partners — Admission, Retirement and Death — Insolvency, Dissolution and Winding up — Joint Stock Company — Indian Companies Act — Formation Memorandum and Articles of Association — Prospectus — Capital and its classes — Shares and Debentures — Statutory Books — Divisible Profits and Dividends — Meetings of Directors and Shareholders — Procedure Amalgamation, Absorption and Reconstruction — Winding up — Holding and subsidiary Companies — Rights and Duties of Directors, Auditors and Liquidators.

Instruments of Credit and their uses — Sale of Goods — implied Conditions and Warranties — Passing of Property in the goods — Remedies of Buyer and Seller — Hire and Instalment Purchase.

Functions of Banks — Commercial and Central Banks.

Means of Payment — Agency — Rights, Duties and Liabilities — Termination.

Financing of Industries — Large and small scale Industries — Managing Agency System — Industrial Finance Corporation — State Aid to Industries — Issue of Debentures.

Chamber of Commerce and allied Institutions for promotion of trade.

Advertising and Salesmaship.

Books for References:

Evelyn Thomas : Theory and Practi e of Commerce.

Stephenson : Theory and Practice of Commerce.

Mitra, J.C. : Business Organisation.

Haney : Business Organisation.

Krishnaswami, O.R. : Essentials of Commerce.
Dr. B. V. Naidu and Datta : Business Organisation.
Palmer, A. : Company's Secretarial Practice.

(49)

Economics Geography

(i) The scope and content of the subject — Economics Geography as a dynamic science — a study of the diversity of human productive occupations in correlation with the environment both physical and cultural for utilisation of World's natural resources.

(ii) Distribution of land, sea and general relief of the world.

(iii) Major natural regions of the world.

(iv) *Agriculture :* Types and systems and their distribution factors influencing Agriculture — Problems facing the development of Agriculture — Modern trends.

(v) Factors governing distribution, production, utilisation trade of the following :

(*a*) Food crops — Rice, wheat, maize, and millet.

(*b*) Live-stock and fisheries — Hides and skin, silk, meat, dairy products, fur and wool, fish and fish products.

(*c*) Commercial crops — sugar, tea, coffee, cocoa, oilseeds, tobacco, rubber, fibres.

(vi) Forests — Classification — Distribution — Production of major products Utilisation and conservation.

(vii) (*a*) Minerals — Important metallic and non-metallic minerals.

(*b*) Sources of energy — Coal, oil, Water power and others.

(*c*) Industries — Iron and steel, textiles, Engineering, Electrical, Chemical and food processing industries.

(viii) Transport — Modes of transport — Roadways — Railways, Airways, Inland waterways — Ocean routes — Coastal shipping.

(ix) Trade — Inland and foreign trade — Trade — Centres — Ports and hinderland — Pattern of world trade.

(x) Population — Size and growth — Pattern of distribution — Migration Population as a factor in economic development.

(xi) Natural resources — Planning — Conservation — Utilisation (With particular reference to India).

References :

1. Gunner Alexander Son : Geography of Manufacturing.
2. Zimmernan : World recources and Industries.
3. Van Royan and Bengtson : Fundamentals of Economic Geography.
4. Das Gupta, A. : Economic and Commercial Geography.
5. Lollmorgan : Conservation of natural resources.
6. Shaw : Economic Geography.
7. Hull, G. : Geography of Production.
8. Thatcher, W. S. : Economic Geography.
9. Heint Zelman and Highsmith : World Regional Geography.
10. Chaudry : Economic Geography.
11. Cooper, E. H. : Introduction to Economic Geography.
12. Bari : Economic and Commercial Geography.

Branch V—Geography Main

(Ancillaries)

History of India—Paper I and II.

(Syllabus same as for Br. I — Histroy Main — vide. syllabus Nos. 1 and 2 respectively).

Elements of Economic Statistics.

(Same syllabus prescribed as ancillary for Br. IV — Economics main — vide. syllabus No. 47).

Principles of Economics.

(Syllabus same as for Br. IV — Economics main — vide. syllabus No. 30).

Indian Economic Problem.

(Syllabus same as for Br. IV — Economics main — vide. syllabus No. 32).

Branch VI—Philosophy Main
(Ancillaries)

General Psychology.

(Syllabus same as for Br. III (*a*)—Social Sciences main —vide. syllabus No. 22).

Philosophy of Religion.

(Syllabus same as for Br. III (*a*) — Social Sciences main vide. syllabus No. 21).

Indian Logic — syllabus will be prescribed later.

European Logic — Syllabus will be prescribed later.

Sociology — Syllabus will be prescribed later.

Politics — Syllabus will be prescribed later.

History — Syllabus will be prescribed later.

General Economics.

(Syllabus same as for Br. III (*a*) — Social Sciences main — vide. syllabus No. 24).

Branch XIII—Indian Culture Main

(Ancillaries)

Ethics.

(Syllabus same as for Br. VI — Philosophy Main — vide. syllabus No. 41).

(50)

Comparative Religion

1. What is Religion ? Necessity for Religion, Primitive religions Animism, Totemeism, Fetishism, etc. Historical Religions, Hinduism, Buddhism, Jainism, Judaism, Christanity, Islam, Zoro-strianism, Taoism, and Confucianism. Founded religions and religion not traced to a founder.

2. Methodology of Comparative Religion : Philosophical (Hegal, Comete, etc.) Psychological, (Leuba, James). Historical (Schmidt) etc., contribution of Anthropology to comparative study of religion.

3. Scriptures of the Great Religion, their authority, the validity of faith, reason, and intuition in religion. Relation between philo-sophy and religion.

4. Basic concepts of Religion : God, Man and Nature. God : Proof for the existence of God : The concept of God in Hinduism. Concept of God in Advaita, Visistadvaita, Dvaita, and Saiva Siddhanta, Buddhism and Jainism, Christianity, Islam and Zorostrianism.

Man : Nature of man, his origin and destiny in immorality with reference to the religions and systems given above.

Nature : Theories of origin of the world. The ontological status of the world. The problem of evil.

5. Religious attitudes and practices. Rituals, their significance; meaning of idol worship, prayer, fasting, pilgrimage and service.

6. Mystics and mysticism : Different types of Mysticism, different forms of approach to God, dasa, putra, vatsalya, sakhya, prema-bhavas significance of nayaki-nayakabhava. Illustrations from the lives of the mystics of all religions.

7. Religion and society : Religions — basis of social service. Asceticism — its true significance ; brotherhood of man and fatherhood of God.

Note :—Stress is to be laid on the points of agreement among the main religion : where differences have to be brought out, no attempt should be made to evaluate any religion as superior or inferior.

Bibliography :

1. Alban G. Widgery : Comparative Religion.
2. James, E.O. : Comparative Religion.
3. Radhakrishnan : East and West in Religion.
4. Radhakrishnan : The Hindu View of Life.
5. T. M. P. Mahadevan : Outlines of Hinduism.
6. D. S. Sharma : What is Hinduism ?
7. Kenneth, W. Morgan : The Basic Belief of Hinduism.
8. Floyd H. Ross and Tynett Hills : Questions that matter most asked by the World's great religions (Beacon Press, Boston, USA).
9. Ruth Grantson : World Faith.
10. Joachim Wach : Comparative Study of Religion (Columbia University).
11. A. C. Bouquet : Comparative Religion (Pelicon Books)
12. The Great Scriptures : } Available with M/s. Ganesan
13. A Seminar on Saints } & Co., Madras-17.
14. Ten Indian Saints of India by Dr. T. M. P. Mahadevan, Available at Bharatiya Vidya Bhavan, Bombay.

B.Sc. DEGREE EXAMINATION

Part III

Group A—Main Subject

1. Methematics
2. Physics
3. Chemistry.
4. Botany.
5. Zoology.
6. Geology.

SYLLABUS

Branch I—Mathematics Main

(1)

Mathematics I

Algebra, Calculus and Geometry :

Algebra : Partial fractions. Inequalities. Convergence and Divergence of Series. simple tests. Binomial and exponential Theorems for a rational index. Homogeneous Products. Binomial, Exponential and logarithmic Series (Simple Problems and Summation of series) : Summation of series by method of differences. Standard forms : Method of Finite differences (2nd and 3rd order differences in A. P. or in G. P.) Recurring Series.

Calculus : **Differential Calculus** Limits. Differentiation of Algebraic, Trigonometric, Exponential. Logarithmic, hyperbolic Inverse Trigonometric, Inverse hyperbolic function ; Rules of Differentiation. Logarithmic Differentiation ; Successive Differentiation. Liebntz's Theorem Differential coefficient as a rate measure — Velocity and Acceleration — Equations of Tangent and normal — Lengths of Tangent, normal, subtangent subnormal. Curvature — radius of curvature, centre of curvature — Mean Value Theorem — Indeterminate Forms — Maxima and Minima of functions of one variable — Partial Differentiation — Total Differentiation — Approximation and errors.

Geometry : (In proving results in geometry any method pure, analytical, or mixed can be used) *Analytical Geometry of Two Dimensions :* Rectangular axes ; Introduction — change of axes — Translation and

rotation — General Equation of second degree — Pairs of Straight lines —angle between them — equations of bisectors — circle — Standard equation — Radical axis orthogonal and coaxal circles — conics defined by focus directrix property, Standard equation of Parabola, Ellipse, Hyperbola. Equations to Tangent — normal — chord with given mid point — Pair of tangents from a point — orthoptic Locus — Pole and Polar — conjugate Points and Conjugate lines — Parametric coordinates ; (for circles, Parabola, central conics).

Conjugate diameters of central conics Asymptotes of Hyperbola ; Equations of Hyperbola with respect to Asymptotes ; Conormal and Concyclic points Tracing of conics. Polar coordinates Polar Equations of Line, circle, conic. Equations of chord, tangent, normal, Polar, directrices asymptotes.

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Mathematics II

Algebra, Trignometry and Calculus:

Algebra, Theory of Equations. — Polynomial equation of degree n of a single variable has n and only n roots. Relation between roots and coefficients. Symmetric functions of roots. General Properties of equations of the n-th degree Transformation of equations Multiple Roots Reciprocal equations. Newton's and Horner's method of approximations of roots Des Carte's Rule of Signs. Rolle's Function Sturm's Theorem (No Proof) Applications only. Graphical solution of cubic and Biquadratic Equations.

Determination : Elementary properties of Determinants. Solution of system of linear equations by the method of determinants. Consistence of equations.

Trigonometry : Quadrilaterals ; cyclic, not cyclic, inscribed and circumscribed about circles ; Regular Polygons ; Inverse Trigonometric functions ; Solutions of Equations of the form $a \cos x + b \sin x = c$; Complex Numbers ; Argand's Diagram De Moivre's Theorem Applications Hyperbolic Functions ; logarithms of Complex Quantities. Summation of elementary trigonometric series.

Calculus Integral Calculus : Integration as inverse of differentiation, Integration of standard forms. Methods of Integration by substitution and by parts Reduction Formulate Definite Integrals. Integration as the limit of a sum Application to evaluation of areas, volumes, lengths of curves, areas of surfaces of revolution in cartesian and in polar coordinates.

Mathematics III

Vector Algebra, Calculus and Geometry :

Vector Algebra : Scalars and vectors. Addition of vectors — Scalar and Vector products. Triple products Vector Equations to line and plane.

Calculus : Differential Equations. Formation of differential equations. Equations of first order — Variables separable — Homogeneous Equations Exact equations — Non-homogeneous linear equations — Linear Differential Equations of first order Linear Equations of second order reducible to first order — Bernoulli's Form First order equations of second and higher degrees — solvable for x, y p — Clairaut's equation — Equations of second and higher order with constant coefficients; Equations of second order with variable coefficients (Homogeneous)

$$\left(ax^2 \frac{d^2y}{dx^2} + bx\frac{dy}{dx} + cy = x^n \text{ or } \log x \right)$$

$$\left(a\frac{d^2y}{ax^2} + b\frac{dy}{dx} + cy = emx \text{ or } emx\ f(x) \text{ or } \cos mx \text{ or } \sin mx \right)$$

(a, b, c, constants) Simultaneous equations — first order and degree ; constant coefficients.

Geometry : Harmonic Ranges and Pencils. Complete Quadrangle and Quadrilateral. Inscribed Quadrangle and circumscribed quadrilateral Inversion. To draw a perpendicular from a point to a plane orthogonal Projection ; circle and ellipse.

Analytical Geometry Three dimensions : Introduction Plane straight line sphere. Tangent plane to sphere. Condition that the general equation of second degree may represent pair of planes or a sphere Standard equations in rectangular coordinates of cone cylinder — Ellipsoid and Hyperboloid of one sheet. Equations of Tangents, tangent planes and normals.

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Mathematics IV

Elements of Modern Algebra :

Elements of Modern Algebra : (Introduction to Modern Algebra Neal H. Mccoy Boston ; Allyn and Bacon Inc). (Standard and Treatment as in this book).

Sets : (Countable and uncountable Mappings Equivalence relations. Groups simple Properties. Rings Simple Properties. Integral domain — ordered Integral domain — Mathematical Induction — The Peano Axioms — Division Algorithm — Greatest common divisor — Least common multiple Fields — Fields of Rational, real and complex numbers. Polynomials — Unique factorisation — Vector spaces — Simple Properties — Linear Combinations Basis and Dimension Matrices — (Transpose, conjugate, Adjoint, inverse symmetric skew symmetric, orthogonal Rank). Reduction to Diagonal Matrices, Characteristics Equation Eigen Values. Eigen vectors Systems of Linear Equations. Solutions by Matrices Method Theory of numbers. Elementary properties. Fermat's and Wilson's theorem and their generalisations.

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Mathematics V

Mechanics, Statics and Dynamics :

Mechanics :

Statics : Introduction : Force : Rigid Bodies : Types of forces ; Law of reaction ; Principle of transmissibility of force.

Forces Acting at A Point : Parallelogram law of forces ; Triangle of forces ; Lami's Theorem ; Polygon of forces ; composition of forces ; Expressions for the resultant ; Conditions of Equilibrium : oblique resolution : Systems of Particles.

Moments, Parallel forces couples : Moment of a force about a point Theorem of Moments ; Moment of force about a line ; Resultants of like, unlike parallel forces ; couples ; Theorem of Moments for parallel forces ; Analytical formula for centre of parallel forces : Equivalence of couples ; Specification of a couple ; Composition of couples ; Reduction of a force and a couple in the same plane to a single force ; Allied theorems in couples.

Coplanar Forces : Reduction to a force at any point and a couple ; condition of equilibrium ; Analytical method ; Equations of Resultant Three forces in equilibrium concurrent or parallel Equilibrium.

Friction : Laws of Friction ; Angle of friction ; cone of friction.

Centre of Gravity : Formulae ; rod, Parallelogram triangle quadrilateral, tetrahedron, pyramid, cone ; centres of gravity by integration ; curves, areas, and surface distribution volumes of revolution.

Strings : Equilibrium of strings (catenary and suspension bridge only).

Dynamics : Mectilinear Motion — Velocity ; acceleration ; Parallelogram law of velocities and accelerations ; Triangle of velocities ; Units ; change of velocity ; Angular velocity ; Uniformly accelerated motion ; Acceleration due to gravity.

Kinetics : Force : Units of force : Newton's laws ; Motion in a straight line of a Particle ; Motion on an inclined plane. Momentum : Force as a vector : Work power energy, conservation of energy ; Vertically projected particles and freely falling particles under gravity.

Kinematics in two Dimension Relative velocity :—Relative angular velocity : Resolution and Composition of velocities *Motion in two Dimensions* Equivalence of " force " and " mass X acceleration ". Motion of projectiles ; Range on an inclined plane ; Impulsive forces : Impact of elastic bodies and Laws of Impact of smooth spheres, Direct Impact ; oblique impact ; Tangential and normal acceleration of a particle moving on a circle. *Polar coordinates* ; orbits velocity and acceleration in polar coordinates ; Central orbits ; Elliptic orbit : Force directed to the centre : $F = \mu u^n$; $n \ngtr 2$

Moment of Inertia : Moment of Inertia ; Radius of gyration ; Theorem of parallel axes and perpendicular axes ; M. I. of rod, rectangular lamina, circular ring and disc elliptic lamina ; hollow and solid sphere, Right circular cone and cylinder :

Motion of a Rigid Body : Energy and Momentum ; Rigid Body ; Fundamental principles : Motion about a fixed axis ; Kinetic Energy and angular momentum about a fixed axis ; compound pendulum ; Simple Equivalent pendulum ; centres of suspension and oscillation.

Harmonic Motion : Simple Harmonic Motion ; composition of two simple harmonic motion ; geometrical interpretation of simple harmonic motion ; Simple pendulum.

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Mathematics VI

Astronomy :

Astronomy. (The paper is to contain more Mathematical questions ; Detailed description of Astronomical instruments not expected).

Formulae of spherical Trigonometry (No Proof) (May be assumed). The apparent motion of the heavens and its explanations by the rotation. of the earth. Arguments and proofs : (Pendulum experiment). The celestial sphere. Different system of coordinates. Instruments : Telescope. Reflectors and Refractors. Advantages and disadvantages. The Transit theodolite. The Transit Instrument, meridian circle, the clock. The chronometer. The chronograph. The equatorial sextant. Zenith telescope. Clock error and rate. The right ascension and declination of a heavenly body, latitude and longitude of a place on land or sea. Summer's Method. Form parallel and size of the earth. Phenomena depending on a change of the observer's place on the earth. Parallax (geocentic and heliocentric) Distance and magnitude of the sun, moon and the planets and stars. The atmosphere and its effect on astronomical observations. Dip and refraction. The tangent formula for refraction. Cassini's formula Twilight. Simple Problems connected with the diurnal motion. The apparent annual motion of the sun and its consequences. The ecliptic and its obliquity. The position of the ecliptic at any given instant. The equinoxes and solstices. Determination of the first point of Aries and the obliquity of the ecliptic Effects of Precession and Nutation. The earth's motion round the sun ; Aberration and its effects. Kepler's Laws Newton's deductions. True anomaly ; Mean anomaly ; eccentric anomaly : lengths of seasons : Sidereal time, Apparent solar time. Mean solar time. Equation of time. The calendar Indian standard time. Motion of the moon and her phases. The nodes and their motion. The moon's sidereal and synodic periods. Eclipses and their causes. Ecliptic limits. Number of eclipses. Saros, Solar System. Direct and Retrograde motion of planets. (coplanar circular orbits). The stationary position. Duration of direct and retrograde motions. Phases of planets. Most conspicuous stars. The Principal Constellation. The signs of the Zodiac. Double and Multiple Stars. Variable stars. Nebulae, comets and Meteors. A general descriptive idea of the stellar system.

Branch III—Physics Main

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Part (i) Mechanics and Properties of Matter

Dynamics : Displacement, Velocity and acceleration. Vectors Particle in linear and angular motion, Projectiles, Newton's Laws of motion, conservation laws and their applications. Motion in a circle. Centripetal and Centrifugal forces. Impact and collision phenomena. Direct and oblique impact.

Simple Harmonic Motion : Equation of motion : Super-position of two S. H. M. Lissaj us figures. Damped oscillations. Coupled and forced oscillation and resonance. Simple Pendulum.

Rigid Bodies : Rotation of a rigid body about an axis Moment of Inertia Parallel and perpendicular axes theorems. Kinetic Energy and angular momentum. Couple and Torque. Compound Pendulum.

Gravitation : Law of gravitation. Circular orbits. Kepler's Laws. Newton's Laws of gravitation from Kepler's laws. Gravitational field and potential calculations for a spherical shell and a sphere. Experiments for finding " G " Effects of altitude, latitude, and rotation of the earth on 'g'.

Elasticity : Hooke's law. Elastic limit. Stress, Strain and elastic modulii. Bending and Torsion of simple bodies. Flat spiral spring. Experiments for finding the elastic constants of a solid.

Viscosity : Stream line and Turbulent motion in liquid co-efficient of viscosity. Poiseuille's flow. Variation of co-efficient of viscosity with temperature and pressure.

Surface Tension : Surface Tension and Surface Energy. Forces on thin films and excess of pressures in bubbles and drops. The phenomena of Capillary rise experiments for measuring S. T. and angles of contact. Quincke's drop.

Statics : Composition and resolution of Coplanar forces. Conditions of Equilibrium of Coplanar forces. Friction.

Dimensional Methods : Units and dimensions. Conversion of unit, dimensional methods in Physics.

Part (ii) Heat and Sound

Thermometry : Principle of thermometry. Gas resistance and thermo electric thermometers.

Thermal Expansion : General behavour of solids. Liquids and gases. Regnault's method for absolute expansion of liquids. Anomalous expansion of water. Practical consequence.

Heat Transport : Conduction convection and radiation. Methods of measuring conductivity. (1) Searle's (2) Forbe's (3) Lee's disc methods convection current. Prevosts theory of exchanges. Emissive and absorptive powers. Newton's Law of cooling. Stefan's Law. Optical pyrometers and the solar constant.

Sound : Expressions for plane progressive and stationary waves and the characteristics of such waves. Beats Velocity of Sound in Solid liquid and gaseous media. Doppler effect. Laws of vibration of Stretched Strings. Revibration and acoustics of buildings.

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Thermodynamics and Statistical Mechanics

Kinetic Theory : Postulates : Pressure of an ideal gas ; Boyle's Law ; Charles Law and Avogadro's Law ; Meanfree path. Boltzman's law Degree of freedom. Deviations from Boyle's law — Amagats's Experiments — Andrews experiment. Vander Wall's equation of state and critical constants. Law of corresponding states.

Maxwellian distribution — Equipartition of energy ; Kinetic theory of Transport phenomena ; Conductivity ; viscosity ; diffusion ; Theory of Browniam motion.

Low Temperature : Production of Low temperature; Liquefaction of gases. Joule Thomson effect ; Regenerative cooling. Lindes and Claude's method. Measurement and uses of low temperature.

Properties of matter at low temperature — Super conductivity.

Properties of liquid Helium.

First Law of Thermodynamics : Experimental determination of J. (1) by Searle's method. (2) Rowland's method. (3) Joule's method and (4) Callendar and Barne's method.

Isothermal and adiabatic changes : Two specific heats of a gas. Determination of C_p and C_v. Adiabatic Equation of a gas. Difference between the two specific heats of a gas. Meyer's method of finding J. Determination of the ratio of specific heats of a gas (1) Kund's tube method. (2) Clement and Desorme's method. Siginificance of the ratio of specific heats for a gas from Boltzman's equipartition law ; work done in isothermal and adiabatic expansion.

Second Law of Thermodynamics : Thermodynamical scale of Temperature (Kelvin scale) Ideal gas scale. Refrigeration — First and second latent heat. Equations Change of Boiling Point and melting point. Entropy and change in entropy for a reversible cycle entropy temperature diagram. Entropy and available energy. Entropy and Probability. Calculation of entropy in simple cases. Maxwell's thermodynamic relations and application.

Statistical Mechanics : Elements of Statistical Mechanics entropy and probability ; Distribution law of Maxwell Boltzman ; Applications.

Radiation Theory : Deduction of Stefan's law — Radiation pressure ; Distribution of energy in the Black body radiation Newton's law. Kirchoff's laws ; Pyrometers — Total radiation type and disappearing filament type ; Solar constant effective temperature of the Sun, Stars ; Pyrheliometer.

Thermal radiation of a black body ; Stefan ; Wien and Rayleigh Jean's laws ; Plancks hypothesis and evolution of the radiation problem.

Specific heats of solids : Dulong — Petit's law ; Einstein and Debyes' theories of specific heats ; Zero point energy.

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LIGHT

Geometrical Optics

Rectilinear propagation of light ; Formation of shadows, solar and lunar eclipses intensity of illumination — Illuminating power — Units — Cosine law, candle power, photometers — Rumford's Bunsen's Jolu's Lummer-brodhun, Flicker and photo-electric photometers — Illuminating sources, various kinds.

Laws of Reflection of light at Plane Surfaces

Multiple reflection in parallel and inclined mirrors — Images. Definition and characteristics — Sextant ; Single and double optical levers.

Reflections at Spherical Surfaces

Convex and concave mirrors. Principal focus and focal length relation between the focal length and radius of curvature — Images formed by concave and convex mirrors and the relation between u, v and f. Experimental determination of focal length and radius of curvature of spherical mirrors — Characteristics of images.

Refraction at Plane Surfaces

Laws — Experimental verification. Refraction through a parallel glass slab expression for refractive index and lateral displacement — Relative positions of objects and its image due to refraction through a slab (1) When the object is close to the slab (2) When the object is at a distance from it. Expression for the shift — total internal

reflection and critical angle — Total reflecting prism — Comparison with plane mirrors — Measurement of critical angle and refractive Index — Refractometers (Pulfrich and Wollaston) — Consequences of refraction — Refraction through a prism — Conditions for minimum deviation — Deviation through a right-angled prism and narrow angled prism when light is incident normally — Derivation of $\mu = \text{Sin} (A + D/)_2/ \text{Sin} A/2$ Derivation of $(\mu - 1) A = D$ of narrow angled prism — Spectrometer, its various parts and determination of refractive index. Dispersion — Combination of prism — Achromatic combinations — Direct vision spectroscope, constant deviation prism.

Refraction at Spherical Surface

Lenses : Convex and concave — Focal length ; optic centre relation connecting u, v and f. Characteristic of the images formed relation between focal length of the lenses, refractive index of the material of the lenses and the radii of the curvature of the surfaces — Liquid lenses — Determination of the refractive index of the liquid — Combination of two thin lenses (1) in contact (2) separated by a distance — Determination of the focal length of the lenses — Focal powers chromatic and spherical aberration — Achromatic combination of lenses — Optical instruments, telescopes — Terrestrial — Galelean — Refracting and reflecting telescopes — Magnifying powers of Microscopes, simple and compound, oil immersion Aplanatic surface— Eye-Photographic Camera epidiascope — Projection lantern — Cine Projectors — Binoculars Eyepieces — Defects of the eye correction Coma curvature, Astigmatism, Distortion and depth of focus — Spectrometer, adjustments, measurements of A, D and μ Constant deviation spectrometer — Pulfrich and Wollaston's refraction meter — Spectrum — Pure spectrum — Specrometer, radiation and absorption — Spectra solar spectrum, Fraunhofer lines — Rainbow — Fermat's principle. Thick lenses — cardinal points.

Physical Optics

Velocity of light : Romer, Bradley, Fizeau, Foucault and Michelson's rotating mirror experiments — Significance of Foucaults' experiments Support to wave theory — Wave theory and Corpuscular theory. Huygen's theory of wave propagation. Explanation for reflection and refraction at plane and spherical surfaces — Formula for the lens and total internal reflection.

Interference

Conditions : Young's experiments, Fresnel's Bimirro, and Biprism, experiments for the determination of wave lengths — Shift in the central band when a thin plate of transparent material is introduced. Llyod's mirror — Colours of thin films reflected and

transmitted Newton's rings reflected and transmitted system — Angle Wedge Testing the planeness of the surface — Simple interferometers — Jamin and Rayleigh. Michelson's interferometer and stellar interferometer standardisation of metre — Theory of Fabry Perrot Eatalon and its applications.

Diffraction

Rectilinear propagation : Cornu's Spiral Diffraction at a straight edge — Rectangular aperture — narrow wire — Circular Disc — Diffraction grating (Transmission) Minimum deviation — concave grating and various mountings — Zone plate comparison with lens — Resolving and dispersive power of grating and prism spectrometers — Resolving power of a telescope.

Polarisation

Transverse nature of light waves : Plane polarised light by reflection, refraction and double refraction Brewster's law — Pile of plates — Reflecting polariscope — Huygen's theory of double refraction — Construction of wave fronts — Wave velocity and ray velocity — Wave surface in uniaxial conical refraction — Elliptically and analysis — Half wave plates and quarter wave circularly polarised light and plates Babinet's compensator Nicol — Polaroid — Double image prisms — Verification of Huygen's theory — Rotation of plane of polarisation — Fresnel's explanation — Saccharimetry. Polarimeter half shade and biquartz.

Errors of measurements : Types of error — The normal case of errors probable error — Calculation of probable error from the residuals weighting of observations.

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MAGNETISM AND ELECTRICITY

Magnetic Phenomena : Poles

Inverse square : Force between poles unit pole — Magnetic field — Couple on a magnet in a magnetic field, magnetic moment — Intensity of field (1) at a point along the axis ' End on ' position (2) at a point along the equatorial line ' broad side on position ' field at any point for a short magnet — Neutral point and mapping of field— force and couple between two magnets (1) placed axially and (2) placed at right angles — Earth's magnetic field — Magnetic elements and their measurements — Variation of these elements — Magnetic compass gyrostatic compass on ships.

Magnetic Potential

Magnetic shell — Strength — Potential at a point in the field of a shell — Potential energy of a small magnet in a magnetic field — magnetic potential at any point (1) along the axis and (2) along the equator and (3) at any point for short magnet — Intensity of magnetisation — Tangent law — Deflection magnetometer — Tan A and Tan B positions — Comparison of M and H and verification of inverse square law — Vibration magnetometer determination of m, M and H Gauss theorem Coulomb's modification — Total normal magnetic induction.

Magnetic Properties

Magnetic induction — Permeability — Susceptibility and relation between H, I, μ, B and K-Determination of permeability (Ferromagnetic substances) only. B-H curves — Magnetic hysterisis — Cycle of magnetisation and energy dissipated in a cycle of magnetisation. Dia, Para and ferro magnetic substances — Molecular theory of magnetism Electron theory of magnetism and qualitative explanation of dia, para and ferro magnetism.

ELECTRICITY

Electrostatics

Fundamental phenomena. Charging by induction — Gold leaf electroscope Faraday's ice pail experiments — Insulators and conductors — Coulomb's law Verification action of points lightning conductors — Force between charged bodies — Inverse square law — Dielectric constant — Gauss theorem : field intensity due to (1) a uniform surface distribution of electricity of a sphere (2) an infinitely long conductor and an infinite plane — Intensity due to a uniform volume distribution of electricity in a sphere.

Electrostatic Potential

Potential at a point — Equipotential surfaces Potential gradient and field intensity — Charge resides on the surface of the conductor — Electrostatic shielding ; Cavendish experiments — Verification of the inverse square law Coulomb's law — Mechanical stress on the surface of the charged conductors — Relation between the potential and energy of an insulated charged conductor — Electrostatic field — Lines and tubes of force — Faraday tubes — Interpretation of force between charged bodies Electrostatic machines ; Electrophorus Van de Graff's high voltage generator.

Capacity

Capacity of an isolated sphere — Influence of neighbouring charge on the capacity of the condenser. Condenser in series and in parallel — Spherical — Cylindrical and parallel plate condenser — Force between parallel plate condenser with different dielectric — Guard ring — Kelvin absolute electrometer.

The Sharing of charges — Loss of energy in sharing the charge — The quadrant electrometer — Hetrostatic and ideostatic uses — Measurement of pd comparison of capacities and ionisation current.

Capacity of a Condenser

Effect of capacity when the space between the plates is filled with a dielectric — Faraday tubes in dielectrics — theorem for a field with dielectrics — Lines and tubes of induction Gauss theorem for a field with dielectric — Polarisation and electric dipole — Capacity of a parallel, plate condenser when a slab of dielectric is inserted between the plates — Force between the plates when they are insulated and when the dielectric is introduced — Measurement of dielectric constant with absolute and quadrant electrometers — Polarisation and dipole moments.

The Method of Electrical Images

In the case of small body placed near an infinite conducting plane maintained at zero potential — Calculation of the force and charge.

Electrodynamics

Magnetic fields of the currents — Current measurement ; Ampere's theorem equivalent magnetic shell — Magnetic field of a linear current element — Field on the axis of the circular current — Tangent galvanometer — Helmholtz Galvanometer — Periodic and sensitive mirror galvanometer — Moving needle type and coil type — Sensitive mirror cussion ; magnetic field of infinitely long straight conductor carrying current — Magnetic field in a solenoid Magnetic field and induction in a solenoid with an iron core — Forces between straight parallel wires carrying current — Force between two circular coaxial coils of nearly the same diameter placed close together — Electro-dynamometer — Kelvin's ampere balance — Determination of international ampere in absolute electromagnetic units.

Metallic Conduction and Resistance

Ohm's law — Definition of resistance Unit — Verification of law — Combination of resistances in series and in parallel specific resistances, Conductivity — Shunts — Universal shunt — Distri-

bution of a steady current in a net work — Kirchoff's laws application to Wheatstones net work — P. O. box, metrebridge and Careyfoster's bridge — Variation of resistance with temperature Calendar and Griffith's bridge — Ammeter and Voltmeter.

Electrolytic Conduction

Faraday's Laws of electrolysis ; electrochemical equivalent — Ions Conduction through solutions of electrolytes — Faraday's laws — The Verification of Faraday's laws — Equivalent conductivity — Arrehenius theory — Strong and weak electrolytes — Hittorfs' diagram — Transport number Absolute velocities of ion.

Electromotive Force

Contact potential — Electrode potential Simple voltaic Cell and its defects. Emf of a cell — internal resistance — Daniell's cell, Leclanche's Cell, Dry cell accumulators, acid and alkali type, standard cell — thermodynamics of reversible cell — Gibb's Helmholtz equation — Calculation of emf of a Daniell cell from thermochemical data.

Electrical Measurement

Measurement of emf current and resistance by potentiometer — Internal resistance by potentiometer — The ballistic galvanometer — Suspended needle type — coil type — Logarithmic decrement — Constant of a ballistic galvanometer — Measurement of absolute capacity of a condenser comparison of electro-magnetic and electrostatic units capacity — Heating effects of current — fuses ; determination of J.

Thermoelectricity

Seebeck's effect and Peltier effect — Difference between Peltier and Joule heating effect — Law of intermediate temperatures — Experimental demonstration of determination of Peltier co-efficients — Thomson effect — Experimental demonstration — Thermodynamics of thermoelectric circuits — Peltier and Thomson co-efficients — as functions of temperature — thermo emf as function of temperature thermoelectric power and thermoelectric diagram measurement of the emf of the thermo-couple thermoelectric pyrometer and thermopile.

Electromagnetic Induction

Faraday's experiments Lenz's law — Expression for the induced emfs. Foucault's currents — Flux linfled with a circuit due to a current — Co-efficient of self induction. Co-efficient of mutual induction, work done — Co-efficient of Coupling $=/M\sqrt{L_1 L_2}$ calculation of co-efficient of induction ; in simple cases — Standard

solenoid instantaneous value of emf induced in a circuit rotating in a magnetic field — Growth of current in a circuit containing inductance, capacity and resistance when a steady emf is applied the decay of current when emf is removed — time constant of the circuit. Induction coil — work done in establishing a steady current in a circuit. The energy in the electromagnetic field due to a current in the circuit.

Calibration of a ballistic Galvanometer using a standard solenoid — Hibbert's standard and Earth inductor — Determination of dip-Experimental determination of co-efficient of self and mutual induction — experimental determination of international ohm in absolute electromagnetic unit — Charging and discharging with resistance — Measurement of high resistance.

Alternating Current

Rotating coil and motor effect of Faraday's current through a circuit containing inductance and resistance emf in a circuit with resistance inductance and capacitance — Impedance, reactances — R. M. S. Values of the emf and current Power in A. C. circuits ; Choke power factor of a choke Wattless current — Oscillating charge and discharge Amplitude, phase and frequency — High frequency oscillatory currents — Tesla coil ; skin effect — Transformers, energy loss, iron loss and copper loss — Transmission of power. Measurement In A. C. circuit — Determination of frequency by sonometer—H. F. measurements — Hot wire ammeter — Transformer for extending the range of ammeters and voltmeters.

A. C. and D. C. Generators — Distribution system shunt, series and compound wound generators and their characteristics series and shunt wound — D. C. motors and their characteristics uses—Induction motors — Efficiency of a motor — Simple A. C. Bridge Circuit.

Simple applications of electricity — Telegraphy — Telephone — Microphones and Loudspeakers — Electric lighting — Heating, efficiency of electric lamp — Sodium vapour lamp — Mercury vapour lamp — Fluorescent lamp — Arc lamp Maxwells equation — Propagation of Electromagnetic waves through material media Radiation from dipole.

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Modern Physics

Spectroscopy : Line and Band Spectra — Series Spectra — Infra red and Ultraviolet Spectra — Transformation of radiation (fluorescence and phosphorescence) : Doppler Effect and its application in light : Zeeman Effect (Outline only).

Quantum Theory and its application: Origin of the Quantum Theory : Planck's Law of distribution of energy in Black Body Radiation ; Einstein's theory of light quanta-photons.

The Electron: Discharge of electricity through rarefied gases ; Cathode rays ; e/m by Thomson's and Dunnington's method ; Millikan's experiment on the electronic charge.

Thermionic Emission: Richardson's T^2 law and its verification ; Work Function ; dull emission and cold emission ; thermionic valves ; cathode ray oscillograph.

Photoelectric Emission: Nature of the phenomenon : Einstein's equation and its Experimental Verification ; photoelectric cell and its applications.

Positive Rays: E/M Thomson's positive ray analysis ; isotopes ; Aston's and Bainbridge's Mass Spectrographs.

The Atom: Thomson's, Rutherford's and Bohr's models of the atom ; the hydrogen spectrum : Lymann, Balmer and Paschen Series ; effect of the nuclear mass ; Sommerfeld's extension to elliptic orbits (qualitative treatment) ; excitation and ionisation potentials and their determination.

Vector Model of the Atom: Electron spin and the fine structure of sodium D lines ; quantum number ; Pauli's Exclusion Principle and its application to the periodic table of elements.

X-Rays: Production and properties : gas and Coolidge tubes ; X-ray plant installation ; X-Ray diffraction — Bragg's Law ; X-ray spectrometer ; characteristic X-rays — Moseley's Law ; origin of characteristic X-Rays, Compton Effect — change of Wavelength : experimental verification.

Nuclear Physics: Natural Radioactivity : Alpha beta gamma rays ; half life period ; ionisation chamber, Gaiger-Muller Counter, Wilson's Cloud Chamber, Bubble Chamber and Nuclear Emulsion technique ; artificial transmutation of elements ; high voltage generators ; the Van de Graaf generator and the Cyclotron ; induced radio activity ; positron and neutron ; mass defect and binding energy ; pair production.

Nuclear Fission: Chain reaction ; atomic energy and its uses ; equivalence of mass and energy ; nuclear fusion ; C-N cycle ; solar energy.

Cosmic Rays : Discovery ; ionisation-depth curves ; lattitude effect ; East-West Asymmetry ; cosmic ray showers ; the penetrating component ; the meson ; elementary particles ; Origin of Cosmic Rays.

Molecular Scattering of Light : Rayleigh scattering and Raman Effect *Wave Nature of Matter :* De Broglie's theory — electron diffraction : G. P. Thomson's experiment ; the electron miscroscope and its applications ; the Uncertainty (General ideas only).

Electronics : Series circuit parallel circuit ; resonance ; resistance in resonance circuits — sharpness of tuning ; Crystal rectifiers ; the valves — diode and triode ; their characteristics ; tube constants ; thyratron and its application : cathode ray oscillograph : the rectifier circuits, filters in power supplies ; mercury arc rectifiers. Triode as a rectifier ; triode as an amplifier ; voltage amplification — resistance-capacity coupling ; triode as a generator of oscillations ; simple ideas of amplitude modulation ; elements of broadcasting and reception — the straight receiver and the heterodyne receiver ; aerials ; ionisation layers ; atmospherics. Principles of Television and Radar. Elementary ideas of the junction transistor and its working.

LIST OF EXPERIMENTS FORMING THE COURSE IN PRACTICAL PHYSICS FOR THE THREE YEAR DEGREE COURSE (PHYSICS MAJOR)

A. General Physics

1. Spherometer and sinlge Optical lever.

2. Balance — Sensibility and correction for buoyancy.

3. Specific gravities of liquids and solids (heavier and lighter than water. Soluble and insoluble in water) using hydrostatic balance.

4. Specific gravity bottle — Specific gravities of liquids and solids (soluble and insoluble in water).

5. Nicholson's Hydrometer Test tube float, and common hydrometer.

6. Boyle's law. Fortin's barometer.

7. Parallelogram law of forces — Triangular law of forces Lami's Theorem and Tangent law — Verification and determination of mass.

8. Law of parallel forces — Verification and conditions of equilibrium. Weight of non-uniform bar, centre of gravity of irregular lamina.

9. Inclined plane — Mechanical Advantage (1) when power acts parallel to the plane (2) when power acts parallel to the base.

10. Compound pendulum — Bar pendulum — K and 'g' determination.

11. Kater's Pendulum 'g' by Bessel's formula and method of coincidence.

12. Young's modulus by stretching.

13. Young's modulus by uniform bending.

14. Young's modulus by non-uniform bending.

15. Rigidity by static torsion.

16. Rigidity by torsional oscillations.

17. q, n and by Searle's apparatus.

18. Moment of inertia — Torsional pendulum.

19. Moment of inertia — Comparison — Bifilar pendulum.

20. Surface tension — Capillary rise.

21. Surface tension by pull on a plate.

22. Surface tension by weight of drops S. T. at water oil — interface.

23. Surface tension of mercury, Quincke's drop.

24. Viscosity by flow of liquid in capillary tube and comparison of viscosities.

B. Heat

25. Co-efficient of linear expansion — Optic lever.

26. Co-efficient of expansion of liquid — Specific gravity bottle.

27. Co-efficient of increase of pressure of air at constant volume.

28. Co-efficient of expansion of air at constant pressure.

29. Specific heat of a liquid using a solid — Barton's correction.

30. Latent heat of fusion of ice.

31. Latent heat of steam.

32. Melting point, cooling curve, boiling point of a liquid J tube.

33. Newton's Law of cooling — Verification — Specific heat of a liquid by cooling.

34. Thermal conductivity — Searle's apparatus.

35. Thermal conductivity — Bad conductor — Lees' apparatus.

36. J. Friction cone apparatus — deleted.

C. Light

37. Photometers — Bunsen's and Jloy's.

38. Direct refraction — Determination of refractive index of solids and liquids by parallax method and by microscope.

39. Refractive index by critical angle (1) Glass prism (2) Air cell.

40. Focal length of a concave and convex mirrors.

41. Focal length of convex and concave lenses — Auto collimation.

42. Refractive index of material of convex lens and concave lens.

43. Refractive index of a liquid — Liquid lens.

44. Magnifying power of a microscope and telescope.

45. Resolving power of a telescope.

46. Spectrometer — Refractive index critical angle.

47. Spectrometer — Refractive index of material — Minimum deviation.

48. Spectrometer — Refractive index of liquid — Hollow prism.

49. Spectrometer — Refractive index of material of narrow angled prism.

50. Spectrometer — i-d, i-i' curve — Stoke's method.

51. Spectrometer — Dispersive power of the material of the prism.

52. Spectrometer — grating — Wavelength of light — Normal incidence Dispersive power.

53. Spectrometer — grating — Wavelength of light — Minimum deviation method.

54. Newton's rings reflected light — Radius of curvature.

55. Wavelength of light — Biprism — Optic bench.

56. Polarimeter — Rotation of plane of polarisation.

57. Solar spectrum — Fraunhofer lines.

D. Sound

58. Frequency by resonance column ; and correction.

59. Volume resonator.

60. Frequency by falling plate.

61. Kundt's dust tube — determination of q of rod and velocity of sound in a rod.

62. Sonometer — Verification of laws of transverse vibration.

63. Sonometer — Frequency of Fork.

64. Melde's experiment.

E. Magnetism

65. Deflection magnetometer — Comparison of Magnetic moments.

66. Deflection magnetometer — Verification of inverse square law Gauss method and pole strength — Long magnet.

67. Vibration magnetometer — Pole strength — Inverse square law.

68. Determination of M and H.

69. Mirror magnetometer ; inverse square law verification.

70. Hysteresis by magnetometer method.

F. Electricity

71. Resistance by post office box — Specific resistance.

72. Resistance by Metre Bridge — Specific resistance.

73. Absolute Measuremnt of current by tangent galvanometer — Calibration of ammeter.

74. Electro-chemical equivalent of copper — Copper Voltameter.

75. Field along the axis of a coil — Deflection magnetometer.

76. Field along the axis of a coil — Vibration magnetometer.

77. Conductivity of an electrolyte.

78. E. M. F. by potentiometer.

79. Current by potentiometer — Ammeter calibration.

80. Resistance by potentiometer.

81. Internal resistance of a cell by potentiometer.

82. Standardisation of potentiometer — Low range voltmeter calibration.

83. Potentiometer — Calibration of high range voltmeter.

84. Potentiometer Rayleigh's form.

85. Carey Foster's method of comparing nearly equal resistances.

86. Temperature co-efficient of resistance.

87. Comparison of low resistance by direct deflection.

88. High resistance — Comparison and determination.

89. Resistance of a galvanometer by half deflection method.

90. Figure of merit of a galvanometer — Current and voltage sensitivity.

91. Mechanical equivalent of heat — Joule's law.

92. E. M. F. of a Thermocouple by potentiometer.

93. E. M. F. of a Thermocouple by direct deflection method.

94. Constant of a ballistic galvanometer — Hibbert's standard— Condenser method Quantity sensitivity.

95. Search coil ; pole strength of magnet.

96. Comparison of Emfs, by capacity and ballistic galvanometer.

97. Internal resistance of a cell by ballistic galvanometer.

98. Absolute measurement of capacity.

99. Comparison of mutual inductance by ballistic galvanometer.

100. Absolute measurement of mutual inductance.

101. Earth inductor (1) Constant of a ballistic galvanometer, (2) Dip, (3) H.

102. Self inductor — Anderson's method.

103. Characteristic of a triode valve.

(a) *Book recommended for study*

1. Nightingale : Higher Physics.

2. Starling and Woodal : Higher Physics.

3. Loney : Elements of Dynamics, Statics and Hydrostatics.

4. M. Narayanamurthi and K. S. Venkatesan : Mechanics, Vol. 1 and 2 (National Publishing Company).

5. Mathur : Properties of Matter (S. Chand & Co., Delhi).

6. S. R. Govindarajan and Murugaiyan — General Physics (National Publishing Company).

7. S. Ramamurthi : Sound — National Publishing Company.

8. Laxman and Saxana : Sound — Chand and Company.

9. S. R. Govindarajn and T. Murugaiyan : Sound (Rochouse and Sons).

10. Winstanlly : Sound (Longmans).

11. Savari Rayan, Krishnan and Venkatesan : Text-Book of Heat.

12. Noakes : Heat (Macmillan and Company).

13. Tyler, F. : Intermediate Heat (Edward Arnold Company).

14. N. Ananthakrishnan — S. R. Govindarajan and Rajagopalan : A Text-book of Heat (S. Viswanathan).

15. Sethi and Raizada : A Text-book of Optics (S. Chand and Company, Delhi).

16. Noakes : Light (Macmillan and Company).

17. K. S. Mandalam Iyer and Narayanamoorthy : Text-book of Light (S. Viswanathan).

18. S. Ramamurthi and Rajagopalan : Light (National Publishing Company).

19. Rossi — Adison Weskey : Optics.

20. M. Narayanamurthi : Electricity and Magnetism.

21. S. Ramamurthi and Krishnaswami : Text-book of Electricity.

22. D. N. Vasudeva : Magnetism and Electricity (Chand and Company, Delhi).

23. Nelkon : Electricity and Magnetism (Arnold and Company).

24. H. G. Mitchell : Electricity and Magnetism (Methuen).

25. S. Ramamurthy : Modern Physics — National Publishing Company.

26. J. B. Rajam : Modern Physics (Chand and Company).

27. Card, Macdonell and Spicer Arnold : Modern Physics.

28. Kaplan Adison Wesley : Nuclear Physics.

29. Atomic and Nuclear Physics — Introduction to Rolt Reinmana and Company.

30. Sri K. S. Venkatesan : Practical Physics.

31. P. S. Varadachari and P. Thangarajan : Ancillary Physics (National Publishing Company).

(b) Books for reference

1. Starling and Woodal : Higher Physics.

2. Barnard : Elementary Statistics and Dynamics.

3. Humphrey : Dynamics — Statics and Hydrostatics.

4. McKenzie : A Second course in General Physics, (O. U. P.)

5. Kronig : General Physics.

6. Nelkon : Mechanics and properties of Matter (Arnold).

7. S. G. Starling : Mechanical Properties of Matter (Macmillan).

8. F. C. Mee : A Text-book of Sound (Heinland and Company).

9. Allen and Maxwell : A Text-book of Heat (Macmillan).

10. Yawood : Electricity and Magnetism.

11. McKenzie : Second course of light (O. U. P.)

12. Barton : A Text-book of light (Longmans).

13. Noakes : Electricity and Magnetism (Macmillan).

14. Hutchinson : Advanced Electricity and Magnetism.

Branch IV—Chemistry Main

(12)

General Chemistry

Inorganic Chemistry :

1. The classification of elements into metals, non-metals and metalloids. The contribution of Dobereiner, Newlands, Mendeeleff and Lother Meyer in classifying elements.

2. *Hydrogen :* Preparation, manufacture properties, and uses Heavy Hydrogen.

3. *Oxygen :* Preparation, manufacture, properties and uses. Oxides of metals and their thermal stability. Acidic, basic and amphoteric oxides. Higher oxides.

4. *Water :* Hard and soft waters : Methods of purification and softening, Composition of water by weight and by volume. Eflorescence and deliquescence. Action of water (liquid and vapour) on metals and non-metals. Heavy water.

5. *Ozone and hydrogen peroxide :* Preparation, manufacture, properties and uses. Composition and relationship with Oxygen and water respectively. Structural formulae of ozone and hydrogen peroxide. Oxidation and reduction.

6. Radio activity and the laws of radio active decay.

7. *Structure of the atom :* Periodicity of the properties of elements. Mosley's work on atomic numbers — Isotopes — Tranmuration of elements — Tracer elements.

Physical Chemistry :

1. *Atomic Weights :* Chemical formulae and stoichiometric equations. Determination of atomic weights.

2. *Ideal gas laws :* The laws of Boyle, Charles, Gay Lussac, Graham. Vapour densities : Experimental determinations by the methods of Regnault, Dumas, Hoffman and Victor Meyer. Avogadro's hypothesis : Molecular weights of gases and vapour Limiting densities.

3. Kinetic theory of gases. The behaviour of ideal gases. The equation of state of ideal gases from kinetic theory. Mean molecular velocity and mean free path. Binary collisions between similar and dissimilar molecules. Real gases. The equation of state of Van der Waals.

4. The solutions of gases in liquids and of solids in liquids Henry's law. Determination of these solubilities Solubility curves and their significance. Supersaturation.

5. Vapour pressure of solutions. Raoult's law. Measurements of Vapour pressure differences. Determination of the molecular weights of non-volatile solute by cryoscopic and ebullascopic methods Osmotic pressure and its relation to the vapour pressure. Isotonic colutions.

6. *The Chemical Bond :* Historical, the covalent bond, ionic bond, transition from covalent to ionic bond, metallic bond dative and hydrogen bonds.

Organic Chemistry :

1. *The aliphatic Hydrocarbons :* Primary, secondary and tendiary and quartinary carbon atoms. Nomenclature Preparation of alkanes, Substitution and oxidation reactions.

2. *Olofines and acetylenes :* Preparation, Oxidation, reduction, addition (Markonikoffs rule) isomerisation and polymerisation.

3. *Halides :* Preparation, addition products with ammonia amines metals, condensation, hydrolysis, reduction and double decomposition, vinychloride, allyl chloride, allyl bromide, Chloroprene.

4. *Poly halo alkanes :* Preparation of chiroform, carbon tetra chloride and idoform, Specific reaction.

5. *Alcohols :* Preparation of mono, di and trihydroxy alcohols. Replacement, Dehydration and oxidation Allyl alcohol. Production of methyl and ethyl alcohol.

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Organic Chemistry

1. *Ethers :* Preparation, single and double cleavages at the oxygen. linkage substitution.

2. *Halohydrins and oxides :* Preparation, polyfunctional nature of the halohydrins Additive reaction of oxides.

3. *Aldehydes and ketones :* Preparation, oxidation, reduction, addition, substitution of oxygen and of hydrogen, condensation, polymerisation, Preparation and properties of acrolein, crotonaldehyde, mesityl oxide and phorone.

4. *Saturated monocarboxylic acids:* Preparation, reactions of the carboxyl function, dehydrogenation and decarboxylation.

5. *Unsaturated monocarboxylic acids:* Preparation from alcohols, aldehydes halogen substituted acides, hydroxy and amino acids. Reactions of the carboxyl function, oxidation, reduction addition and oxirane ring formation. Shift of the double bond.

6. *Halogen and hydroxy substituted acids:* Halogenation at the alpha carbon atom, substitution dehalogenation. Preparation of alpha hydroxyl acids by cyanhydin reaction. The influence of the position of the hydroxyl group on the behaviour of hydroxy acids. Lactic and tartaric acids. Malic and citric acids.

7. *Oxo substituted acids:* Glyoxylic, formyl acetic, pyruvic acetoacetic and laevulinic acids. General methods of synthesising aldehydic and ketonic acids and special synthesis of acetoacetic ester by Claisen reaction. Special reactions of acetoacetic ester.

8. *Malonic and other dicarboxylic acids:* Preparation and special reactions. Comparison with acetoacetic ester, alpha formyl and cyanacetic ester and acertone dicarboxylic ester. Oxalic, succinic, glutaric and adipic acids. Synthetic uses of melonic ester. Pumaric and Maleic acids.

9. *Acid derivatives:* Anhydrides, acid chlorides, esters and amides.

10. *Aliphatic sulphur compounds:* Preparation of thio-alcohols. Reaction of thio-alcohols with metals, metallic oxides, aldehydes, ketones, organic acids and acylhalides. Oxidation, Mustard gas.

11. *Aliphatic nitriogen derivatives:* Preparation of nitroalkanes. Preparation and properties of urea. Preparation and properties of alkylamines. Ethanolamine. Preparation and properties of alkyl cyanides and isocyaniders.

12. Grignard reagents.

13. *Unsaturated hydrocarbons:* Isolated double bonds, cumulated double bonds, conjugated double bonds. Thiele's theory of partial valency.

14. *Dialdehydes and diketons:* Preparation and properties of glyoxal, methyl diacetyl, succindialdehyde, acetylacetone and aceonylacetone.

15. *Hydroxyaldehydes and hydroxyketones:* Preparation and properties of glycolaldehyde, aldol and diacetone alcohol.

16. *Diazo compounds:* Preparation and reactions of diazomethane and diazoacetic ester.

17. *Carbohydrates:* Nomenclature. Aldotrise, aldotetrose, aldopentose. Glucose and fructose. Reactions of glucose and fructose with phenyl hydrazine. Method of ascending and descending the sugar series. Interconversion of aldose and ketose. Constitution of glucose and fructose.

18. *Alicyclic compounds:* General method of preparation and general properties of cycloparaffins.

19. *Simple Aromatic compounds:* Structure of benzene. Preparation of homologues. Properties. Synthesis of aromatic compounds from aliphatic compounds.

20. *Aromatic halogen compounds:* Preparation and properties of nuclear and side chain substitution products. Polyvalent iodine compounds.

21. *Aromatic nitro compounds:* Methods of nitration. Properties of aromatic nitric compounds and nitroso compounds. Reduction products of nitro compounds Phenylhydroxylamine.

22. *Aromatic aminon compounds:* General methods of preparation of primary amines. Aniline, acetanide, chloro, bromo, and nitroanilines. M-alkyl anilines. Hofmann rearrangement and toluidines. Diphenylamine, benzylamine and phenylene diamines.

23. *Diazonium Salts:* Diazotisation. Replacement reactions. Reactions to which nitrogen is retained. Structure of diazonium salts. Phenythdrazine. Diazoamino and aminozo compounds. Azoxy, azo, and hydrazo benzenes. Benzidine. Hydroxy azo compounds. Simple azo dyes.

24. *Sulphonic acides:* Methods of sulphonation. Benzene sulphonic acid. Sulphanilic acid. Sulphanilamide. Saccharin.

25. *Phenols:* Phenol, Cresols, halogenated phenols, nitrophenols, aminophenols, nitrosophenol, phenolsulphonic acids, catechol, resorcinol, quinol, pyrogallol, hydroxyquiol, and phloro-glucinol. Anisole, Guiacol.

26. *Alcohols, Qaldehydes, ketones and uinones:* Benzyl alcohol, Betaphenyl ethyl alcohol. General methods of preparing aromatic aldehydes. Benzaldehyde and its condensation freactions. Nitration and halogenation pf benzaldehyde. General methods of preparing phenolic aldehydes. Salicylaldehyde. Acetophenone. Phenacyl chloride. Houben-Hoesch synthesis Benzo-phenone. Benzoquinones.

27. *Aromatic acids :* General methods of preparation. Benzoic acid, Benzoyl chloride, benzamide, nitrobenzoic acids, anthrailic acid, salicylic acid, Phenylacetic acid, mandelic acid, cinnamic acid, phthalic acid, phthalic anhydride, phthalmide, phthaloyl chloride, iso- and terephthalic acids. Esters.

28. *Polynuclear hydrocarbons and their derivatives :* Diphenyl diphenylmethane, triphenylmethane, Triphenylmethyl chloride. Stilbene. Benzoin, hydrobenzoin and benzil. Phthaleins.

Structure of Naphthalene. Oxidation and reduction of naphthane. Nitro naphthalenes. Aminonaphthalenes and their reduction. Naphthalene sulphonic acids. Naphthols and their reduction. Naphthaquinones.

Structure of anthracane, anthraquinone, alizarin.

Structure of Phenanthrene Phenanthraquinone.

29. *Amino acids and polypeptides :* Glycine, alanine, nor-leucinek. leucine isoleucine, tryptophane. Polypeptides.

30. *Heterocyclic compounds :* Pytrol, pyridine, quinoline, isoquinoline.

31. *Alkaloids :* Coniine, Piperine, nicotine.

32. *Terpenes :* Geraniol, citral, dipentene, methol.

33. Formation and stability of free radicals — photochemical fission of bond-thermal decomposition of metal alkyls — thermal fussion of C-C bond other thermal fussions — chlorination of hydrocarbons.

34. *Tautomerism :* The idea of tautomerism, keto-enol tautomerism, nitro-isonitroso tautomerism, amido-imino tautomerism, lactam-lactim tautomerism and quinone oximers.

35. *Molecular rearrangements :* Pinocal rearrangement (Whitmore mechanism) Hofmann and Curtius and transformations, benzilic acid rearrangement, Fries rearrangement, Claisen rearrangement, the diszonium transformation and benzidine rearrangement.

36. *Aromatic substitution :* Inductive effect, mesomeric effect, electromeric effect, and tautomeric effect, Orientation of substituents in benzene. Theory of substitution in benzene : nucleophilic and electrophilic.

37. *Stereochemistry :* Elements of symmetry. Resolution of racemic forms. Racemisation. Walden Inversion. Asymmetric synthesis. Geometrical isomerism Stereochemistry of aldoximes

and ketoximes. Bayer's strain theory and its modifications. Mechanism of addition to double and triple bonds. Allenes and spirans. An elementary knowledge of the optical isomerism of other quadrivalent elements whose valences are directed tetrahedrally.

38. Double and triple bond-conjugated systems. The application of resonance concept to systems like benzene, naphthalene carbon-dioxide, carbon monoxide, nitro and cabolytic acid groups, quniones, Triphenyl methane dyes.

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Physical Chemistry

1. *Attraction between molecules :* Van der Waals — London forces. Boiling points. latent heat of vaporisation, surface tension and parachor association, molecular compounds.

2. Electrical conductivity of aqueous solution 4. Faraday's laws of electrolysis and their significance use in determining equivalents — ionic theory — electrolylic dissociation and Arrhenius concept, equivalent and molecular conductivities of Ions — Kohlmaush's law. Transport numbers — strong and weak electrolytes, — Ostwald's dilution law — interionic attraction — electrode potentials and their application — H — ion concentrations — its, measurement using indicators — conductivity — H electrode — Glass electrode — ion activity — solubility products and its analytical applications — Hydrolysis. Buffer solutions acids and bases — defination — Lowery — Bronsted — Lewis. Very weak acids and bases Strengths of acids and bases — Strong acides and bases — indicators. Dissolution of metals — corrosion and passivity — redox reactions — redox potentials and redox indicators.

3. The first law of Thermodynamics. Internal energy and heat content. Hess's law. Heat of formation, solution, dilution, neutralisation and combustion.

4. Isothermal and adiabatic changes. Carnot's cycle. The Second law of Thermodynamics. Free energy. Clapeyron equation. Joule Thomson effect. Liquefaction of gases. Critical phenomena. Van't Hoff isothern and isochore.

5. The phase rule of Willard Gibbs. Applications to one component and two component systems like the following : Water, sulphur, steam distillation, mixture of benzene and toluene, constant boiling hydrochloric acid, ethyl alcohol-water system, dissociation of calcium carbonate. Partition co-efficient and its applications. Miscibility of liquid systems. Distillation of mixtures of two liquids.

A study of binary alloy systems involving the formation of an eutectic, solid solution and compound. Salt hydrates.

6. Exothermic and endothermic reactions. Reversible reactions. The influence of temperature on reactions. The le Chatelier-Braun principle. Association and dissociation. The law of mass action : enunciation and application to systems like dinitrogen tetroxide, hydrogen iodide, ammonium chloride, phosphorus pentachloride and calcium carbonate.

7. Velocity of chemical change — order and molecularity of reactions. The Arrhenius rate equation and the parameters. The study of the following reactions: The combination of H and I. The reaction between Nitric oxide and Oxigen Decomposition of N_2O_5. The H & Cl reaction thermal and photochemical. Chain reactions and their characteristics — The Hydrolysis of Carboxylic esters — homogeneous and hetrogeneous reactions — Zero order reactions — Absorption at surface.

8. Kinetic theory of gases. The behaviour of ideal gases. The equation of state of ideal gases from kinetic theory. Mean molecular velocity and mean free path. Collisions between molecules of the same kind. Real gases. The equation of state of Van der Waals.

9. The solid state — elements of crystal structure — X-ray study of a cubic crystal.

10. *Properties of molecules in relation to structure :* Dipole moments ; refraction ; molecular spectra ; magnetic properties.

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Inorganic Chemistry

1. The halogens and their compounds.

2. The composition of the atmosphere. Nitrogen, its hydrides, halides, oxhalides, oxides and oxyacids and their salts. Hydroxylamine Fixation of atmospheric nitrogen.

3. Sulphur. Allotropic forms. Hydrides, halides, oxhalides, oxides, oxyides and their salts. Manufacture and uses of sulphuric acid. Selenium. Selenious acid.

4. Phosphorus. Allotropic forms. Hydrides, halides, oxyhalides, oxides oxyacids and their salts. Superphosphates.

5. Arsenic, antimony and bismuth. The elements, their hydrides, oxides, chloides and sulphides. Arsenites and arsenates. Anti-monates of the alkali metals. Sodium bismuthate.

6. Carbon. Carbon suboxide, carbon monoxide and carbon dioxide. Carbonates and bicarbonates and percarbonates. Carbonyl chloride, carbon disulphide, cyanogen, hydrogen cyanide, cyanides and cyanide complexes. Metal carbonyls.

7. Silicon, silicon dioxide, silicic acid, mone and di silanes, Alkali silicates. Carborundum. Silicon tetrachloride and silicon tetrafloride. Borondiborane, boron trifluoride, borontrioxide and boric acids. Borates of sodium. Boron nitride.

8. The general occurrence of metals and principles of obtaining the metals from their oxide and sulphide ores. A comparative study of the following method :

Lithium, sodium, potassium ;

Copper, silver, gold ;

Magnesium, calcium, strontium, barium, radium ;

Zinc, cadimium, mercury ;

Aluminium, lanthanum, actinium ;

Titanium, thorium ;

Tin, lead ;

Vanadium ;

Chromium, molybdenum, tungten (wolfram), uranium ;

Manganese ;

Iron, cobalt, nickel ;

Platinum.

Iodium compound and co-ordination compounds.

LIST OF BOOKS IN CHEMISTRY FOR READING AND REFERENCE :

General Chemistry :

Ehret : Smith's General Chemistry for Colleges (Longmans)

Pauling : College Chemistry (W.H. Freeman & Co.)

Pauling : Nature of the Chemical Bond (Ornell University)

Latimer and Hilderbrand : Principles of Chemistry and Reference

Book of Inorganic Chemistry (Macmillan)

Sidgwick : Electronic Theory of Valency (Oxford)

Speakman : Modern Atomic Theory (Arnold).

Organic Chemistry :

Dyson : Manual of Organic Chemistry (Longmans)

Fiscer and Fieser : Organic Chemistry (Asia Publishing House)

Branch and Calvin : Theory of Organic Chemistry (Prentice Hall)

Hermans : Theoretical Organic Chemistry (Elsevier)

Kipping and Kipping : Organic Chemistry (Chambers)

Schmidt : Organic Chemistry (Gurney).

Hickinbottom : Reactions of Organic Compounds (Longmans)

Noeller : Chemistry of Organic Compounds (Saunders).

Paul Karrer : Organic Chemistry (Elsevier)

Sidgwick : Organic Chemistry of Nitrogen (Oxfor)

Finar : Organic Chemistry, Vols. I and II (Longmans)

Turne and Harris : Organic Chemistry (Longmans).

Inorganic Chemistry :

Moeler : Inorganic Chemistry (Wiley)

Barnett and Wilson : Inorganic Chemistry (Longmans)

Palmer : Experimental Inorganic Chemistry (Cambridge)

Ephraim : Inorganic Chemistry (Gurney and Jackson)

Emeleus and Anderson : Inorganic Chemistry (Routledge)

Philbrick and Holmayard : A Text-book of Theoretical and Inorganic Chemistry (Dent)

Mellor revised by Parkes : Modern Inorganic Chemistry (Longmans)

Partington : A College course of Chemistry (Macmillan)

Sidgwick : The Chemical Elements and their compounds (Oxford).

Physical Chemistry :

Prutton & Maron : Fundamental Principles of Physical Chemistry (Macmillan)

Macdougall : Physical Chemistry (Macmillan)

Glasstone : Elementary Physical Chemistry (Van Nonstrand)

Daniels and Albery : Physical Chemistry (Wiley)

Eastman and Rollefson : Physical Chemistry (McGraw Hill)

W. J. Moore : Text-book of Physical Chemistry (Longmans)

Getman and Daniels : Physical Chemistry (Wiley)

A. J. Mee : Text-book of Physical Chemistry (Heinemann)

Practicals : (Books)

Kolthoff and Sandell : Text-book of Quantitative of Analysis (Macmillan)

Deihl and Smith : Quantitative Analysis (Wiley)

Arthur and Smith : Semimicro Qualitative Analysis (McGraw Hill)

Vogel : Qualitative Analysis (Longmans)

Vogel : Quantitative Analysis (Longmans)

Vogel : Organic Preparation (Longmans)

Middleton : Organic Analysis (Cambridge)

Wild : Estimation of Organic Compounds (Cambridge) ;

Wild : Characterisation of Organic Compounds (Cambridge)

Daniels Mathews and Wilson : Practical Physical Chemistry (McGraw Hill)

Palmer : Practical Physical Chemistry (Cambridge)

Caven : Qualitative Analysis (Blackie)

Clark : Qualitative Organic Analysis (Arnold)

Findlay : Practical Physical Chemistry (Longmans).

Syllabus in Chemistry : Practical

1. Verification of the law of multiple proportions.
2. Verification of the law of definite proportions.

3. Equivalent weight by the conversion of a metal to its chloride.

4. Equivalent weight by displacement of one metal by another.

5. Equivalent weight by conversion of one compound to another.

6. Solubility of a solid at different temperatures. Solubility curve.

7. Solubility of a gas in water. Estimation of the major components of air.

8. Separation of liquids by fractional distillation.

9. Purification of a solid by fractional crystallisation.

10. Acidimetry and alkalimetry :

    (a) Strong acid and strong base system.

    (b) Strong base weak acid system.

    (c) Strong acid weak base system.

    (d) Solubility of acidic and basic substances.

    (e) Determination of sodium carbonate in washing soda.

    (f) Determination of the strength of glacial acetic acid.

    (g) Analysis of sodium hydroxide flakes.

    (h) Hardness of water.

    (i) The Kjeldahl method of noitrogen estimation.

11. Oxidations involving potassium permanganate :

    (a) Estimation of ferrous iron.

    (b) Estimation of oxalic acid and oxalates.

    (c) Estimation of hydrogen peroxide.

    (d) Determination of ferrous and ferric iron in a mixture.

    (e) Determination of calcium.

    (f) Determination of nitrite.

    (g) Determination of manganese dioxide in pyrolusite.

    (h) Estimation of nitrite and chlorate using Bunsen valve.

12. Oxidations with potassium dichromate :

(a) Determination of ferric iron.

(b) Determination of chromium in a chromium salt.

13. Iodimetry :

(a) Estimation of copper, arsenious oxide and hypochlorite.

(b) Estimation of tin.

14. Precipitation and complex formation.

Determination of chlorides in neutral and acid solutions.

15. Gravimetric estimations :

(a) Iron as ferric oxide using cupferron or pyridine.

(b) Magnesium as pyrophosphate or oxinate

(c) Nickel as dimethylglyoxine complex.

(d) Lead as chromate.

(e) Copper as cuprous thiocyanate.

(f) Complete analysis of hydrated barium chloride.

(g) Estimation of calcium as oxalate and as carbonate.

(h) Estimation of lead as sulphate.

16. Qualitative analysis :

(a) Reactions of the following radicals :

Silver, mercury, lead, copper, bismuth, cadmium, antimony, tin, iron, aluminium, chromium, zinc, manganese, cobalt, nickel, calcium, strontium, barium, manganesium, potassium, sodium, ammonium, sulphide, sulphite, carbonate, nitrite, thiosulphate, sulphate, nitrate, fluoride, chloride, bromide, iodide, acetate, oxalate, tartrate, arsenite, arsenate, phosphate, chromate, silicate, borate.

(b) Analysis of a mixture of four radicals including mixture which involve the elimination of interfering radicals.

17. Organic Chemistry :

(a) Distillation under atmospheric pressure and under reduced pressure. Steam distillation.

(b) Preparations involving : Oxidation, reduction esterification, hydrolysis, nitration, sulphonation, halogenation, diazotisation.

(c) Characterisation of organic compounds by their functional groups and confirmation by preparation of derivatives.

18. Physical Chemistry :

(a) Determination of molecular weights by cryoscopic, ebullioscopic and steam distillation methods.

(b) Transition temperature by thermometric method.

(c) Partition co-efficient involving :

(i) Simple systems, (ii) Systems involving the formation of complex and (iii) systems involving association or dissociation.

(d) Determination of heats of solution and heats of neutralisation.

(e) Determination of hydrogen ion concentration by use of indicators.

(f) Study of the kinetics of simple reactions :

Potassium iodide and potassium persulphate, or

Potassium iodide and potassium bromate.

Branch V—Botany Main

(Syllabus for 16 to 19)

1. A general account of the nature of plant viruses.

A general account of the various groups of Bacteria ; a brief study of their morphology and physiology.

2. The main points of structure, development life-history and taxonomic relations of the following groups in general and the general in particulars :

THALLOPHYTA

ALGAE :

Chlorophyceae :

Chlamydomonas, Pandorina, Eudorina, Pleodorina, Volvox, Ulothrix, Ulva, Cladophora, Coleochaete, Oedogonium, Desmids, Caulerpa, Vaucheria.

Bacillariophyceae :

Diatoms.

Charophyceae :

Chara and Nitella.

Cyanophyceae :

Gloeocapsa, Oscillatoria, Nostoc, Rivularia.

Phaeophyceae :

Ectocarpus, Sargassum, Dictyota.

Rhodophyceae :

Batrachospermum, Polysiphonia.

Fungi :

Myxomycetes :

Plasmodiophora.

Phycomycetes :

Saprolegnia, Pythium, Perenospora, Albugo.

Ascomycetes :

Saccharomyces, Penicillium, Pyronema.

Peziza, Claviceps.

Basidiomycetes :

Ustilago, Puccinia, Agaricus, Lycoperdon, Polyporus.

Fungi Imperfects :

Fusarium, Alternaria.

Lichens :

Usnea.

BRYOPHYTA

Riccia, Marchantia, Anthoceros, Porella, Funaria.

PTERIDOPHYTA

Psilotum, Lycopodium, Selaginella, Isoetes, Equisetum, Ophioglossum. Lastrea, Marsilea.

GYMNOSPERMS C

Cycas, Pinus, Gnetum.

MORPHOLOGY A

The External morphology of flowering plants.

TAXONOMY C

Principles of classification with reference to the system of Bentham and Hooker, and of Engler and Prantl ; Modern trends in taxonomy.

The morphology and systematics of the following families of angiosperms.

Ranunculaceae, Anonaceae, Nymphaeaceae, cruciferae, Malvaceae, Sterculiaceae, Tiliaceae, Geraniaceae, Balsaminaceae, Oxalidaceae, Rutaceae, Meliaceae, Papilionaceae, Caesalpinceae, Mimoseae, Rosaceae, Myrtaceae, Cucurbitaceae, Umbelliferae, Rubiaceae, Compositae, Apocynaceae, Asclepiadaceae, Convolvulaceae, Solanaceae, Scrophulariaceae, Acanthaceae, Labiatae, Verbenaceae, Euphorbiaceae, Amarantaceae, Ulmaceae, Urticaceae Moraceae, Cannabinaceae, Orchidaceae, Liliaceae, Palmae, Araceae, Musaceae, Zingiberaceae, Cannaceae, Marantaceae, Cyperaceae, Gramineae.

EMBRYOLOGY A

Historical account — Development and structure of anther and pollen.

Microsporangium, Microsporogenisis, Male Gametophyte.

Development and structure of ovule and Embryosac (Polygonum type) Megasporogenisis. Female Gametophyte, Monosporic, Bisporic.

Tetrasporic types of embryosac, Fertilisation.

Endosperm : Types and development.

Embryo : Dicot (Onagrad type- Monocot (Luzula. type).

Apomixis : Polyembryony, Parthenocarpy.

CYTOLOGY A

4. (*a*) Historical background. Cell concept. Electron Microscopic structure of cell-cell contents. Proto plasm—Physical and chemical properties of cytoplasm-structure and function of cytoplasmic organelles—Endoplasmic reticulum. Ribosomes, Mitochondria, Golgiapparatus, Plastids, Nucleus and its parts, genes — D. N. A., R. N. A. and their role. Non-living inclusion of the cell, Cell-wall-Primary and secondary structure. Its growth, thickening, Physical and Chemical Changes—cell division—Mitosis, Meiosis and their significance. Other types of nuclear divisions such as Amitosis. Free nuclear division, Free cell formation, cell budding.

ANATOMY B

Meristems : Location — Kinds and Properties.

Primary and Secondary tissues and their distribution in the plant body.

Anomalous Secondary thickening — Dracaena and Boerhaavia, only.

PHYSIOLOGY D

(*a*) The chemical composition of the plant.

Material of plant food and their sources.

Absorption of water : Root pressure.

Absorption of ions.

Sand culture experiments with special reference to the use inorganic nutrient salts in plant growth. Liebig's Law of minimum.

(*b*) Soil microflora with reference to Nitrogen fixation. Maintenance of soil fertility in cultivated soil-Rotation of crops.

(*c*) Transpiration : Laws of diffusion. Movements of Stomata-wilting and its significance ; Movement of water solutes and gases. Cohesion theory.

(*d*) Photosynthesis ; photosynthetic apparatus. External and Internal factors. Law of limiting factors Mechanism of Photosynthesis. A brief account of old theories and recent advances (Isotopes, Calvins cycle etc. Chemosynthesis Bacterial photosynthesis, Measurement of Photosynthesis, Carbohydrate metabolism. Fatmetabolism.

(*e*) Assimilation of Nitrogen : Carbon/Nitrogen ratio, and its significance, special methods of obtaining Nitrogen.

Translocation of assimilated products. Enzymes and their actions.

(*f*) Respiration : Aerobic and Anaerobic respiration and their relations. Alcoholic fermentation. Respiratory quotient. Factors affecting respiration. Role of enzymes. P. R. ratio Mechanism of respiration. Recent views on respiration (Glycolysis, Kreb's cycle, role of Mitochondria).

(*g*) Growth : Phases of growth — factors of growth Hormones — Phytochromes Auxin, Gibberellin, Photoperiodism Vernalisation.

(*h*) Movements : classification types, Role of Hormones.

ECOLOGY D

(*a*) Factors of plant habitat — Soil water, soil air.

(*b*) Units of vegetation — Plant succession. Migration and Ecesis. Types of vegetation. Mangrove coastal, scrub and Evergreen.

(*c*) Characteristic features of Hydrophytes. Submerged, floating, and immersed types. Mesophytes with reference to stomata frequency. Xerophytes (Types of Xeric environment.) ;

Physical and Physiological drought.

EVOLUTION AND GENETICS D

(Heredity and Evolution)

(*a*) A general introduction to plant life through the ages.

(*b*) Mendelism with special reference to Mono and Dihybrid ratios. Chromosome theory of heredity, Genetic code.

(*c*) Mutations and the factors that induce them. Origin of species and Theories of evolution.

(*d*) Modern methods of palnt breeding. Improvement of crops.

PLANT PATHOLOGY B

Tobacco mosaic — Citrus canker, Potato blight and Tomato Manganese deficiency.

PRACTICAL WORK

An introduction to Culture technique of Microorganisms and to microtechnique as a demonstration.

Each Student isexpected to have done the following :

(*a*) Preparations illustrating the form and structure of any Plant of the groups or families mentioned in the syllabus and their description with sketches sufficient for their identification.

(*b*) Preparations of permanent slides with double staining.

(*c*) Dissections under the simple microscope of the floral parts of phanerogams ; Making sketches of the parts dissected ; Drawing the floral diagram and giving reasons for referring them to their families.

(*d*) Descriptions in technical terms of plants belonging to the families of phaneorgams specified in the syllabus.

(*e*) Field work under tuition for atleast one week in each of the second and third years.

(*f*) The following experiments in Plant Physiology to be made by the students.

Osmosis — permeability.

Root pressure.

Respiration (Aerobic and Anaerobic)

Photosynthesis (2 experiments)

Transpiration (2 experiments)

Nutrition (Water culture experiments)

Tropism (3 experiments)

Growth (2 experiments)

Demonstration of the use of synthetic hormones in the growth of plants.

At the practical examination candidates are required to submit their laboratory note books. 5 microscopic preparations, in permanent mounts, a collection of about fifty plants with relevant field notes.

Note: Candidates are expected to comment on the experiments set up by the examiners.

Books for Study :

1. Text-book of Botany for India, Pakistan and Ceylon : By Lowson, Howarth, Warner.
2. Plant physiology : By O. Raber.
3. Introduction to systematic Botany : By A. W. Haupt.
4. Cryptogamic Botany : By G. M. Smith (Vols. I & II).
5. Economic Botany : A. F. Hill.
6. Plant Physiology : By Maximov.
7. Introduction to Plant anatomy : By Eames.
8. Plant Ecology : By Weaver and elements.
9. Genetics : By Walter.
10. Structural Botany : By Scott (Vols. I & II).
11. Elements of Plant Pathology : By I. E. Melhus and G. C. Kent.
12. Flora of Madras : By Gamble.
13. Fungi and Plant diseases : By B. B. Mundkar.
14. Classification of Flowering plants : By Rendle.
15. College Botany : By Fuller and Tippo.
16. Taxonomy of Vascular Plants : By Lawrence.
17. Theoretical Botany : By McClean & Cook (Vols. I to III).
18. Cytology : Wilson (Van Nostrand).
19. Embryology of Angiosperms : Maheswari.

Books for Reference :

1. College Botany : Vol. I and II Gangule Das & Datta.
2. Plant Groups : Mukerji.
3. Plant Physiology : Devlin (Van Nostrand).
4. Genetics : Winschester.
5. Cell function : L. L. Langley.
6. Principles of Genetics : Gardner.
7. Cell : Brachet and Mirsky.
8. Cell : Jensen.
9. Cell structure and function : Scikovitz.
10. Biology of cells : Herbert Stern & David Nannaz.
11. Biological Science : Yellow version (adapted) 4 Vols. Madurai University.

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Branch VI—Zoology Main

Theory

Invertebrata :

1. A general survey of the major phyla : Protozoa, Coelenterata, Platyhelminthes, Aschelminthes (Nematoda), Annelida, Mollusca, Arthropoda and Echinodermata. Classification down to orders only will be expected with South Indian examples and a type for each class.

2. The treatment of the various systems should emphasis the functional aspects, namely the physiology of the organelles, organs and organ systems.

Books :

G. S. Carter : General Zoology of the Invertebrates.

L. H. Hyman : The Invertebrata.

B. T. Scheer : Comparative physiology.

M. Ekambaranatha Ayyar : Manual of Zoology, Part I.

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Chordata.

1. General survey of the characters and examples of the Chordates with a type for each class.

2. Classification down to the orders with special reference to South Indian examples.

3. The evolutionary history of the various classes should be studied with stress on the palaeontological connecting links.

4. A comparative study of the structure and working of the various organ systems.

Books :

J. Z. Young : Life of the Vertebrates.

A. S. Romer : The Vertebrate body.

E. H. Colbert : Evolution of the Vertebrates.

W. H. Newman : Phylum Chordata.

Walter & Sayles : Biology of the Vertebrates.

B. T. Scheer : Comparative Physiology.

M. Ekambaranatha Ayyar : Manual of Zoology, Part II.

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Embryology, Cytology and Genetics:

A. EMBRYOLOGY

1. (*a*) Study of invertebrate larvae such as trochophore, glochidium, veliger, nauplius, Zoea, alima, megalopa, bipinnaria and tornaria.

   (*b*) An elementary knowledge of cell lineage.

2. Development upto gastrulation in Amphioxus Frog, chick and pig — arganogency in frog and chick only.

3. Elements of experimental embryology. Knowledge of the following will be expected.

(*a*) Organisers ; (*b*) Differentiation ; (*c*) Fields and gradients ; (*d*) Nuclear transplantation and (*e*) Regeneration.

Books :

L. G. Barth : Embryology.

W. Shumway : Vertebrate embryology.

B. M. Patten : Foundations of Embryology.

C. P. Raven : An outline of developmental physiology.

B. CYTOLOGY

1. Study of the various constituents of the cell.

   (*a*) Chromosomes, genes and nucleic acids.

   (*b*) Mitochondria, Ribosomes, Golgi bodies, Endoplasmic reticulum, Lysosomes and centrioles.

   (*c*) Cell membrane.

   (*d*) Nucleus — cytoplasmic interaction.

2. Mitosis and Meiosis.

Books :

C. P. Swanson : The Cell.

deRobertis : General cytology.

A. C. Giese : Cell physiology.

C. GENETICS

1. Mendelian laws — Simple problems in monohybrid and dlhybrid crosses.

2. Interaction of genes — A study of genetic characters in man will be expected.

3. Behaviour of chromosomes — Linkage Crossing over, Non-disjunction and Sex determination.

4. Polygenic inheritance — Simple problems should be done.

5. The gene concept — Genetic material The Watson — Crick model of D. N. A.

6. Gene action in (*a*) protein synthesis, (*b*) developmental control and (*c*) Populations (The Hardy Weinberg Law).

7. Extra — Chromosomal inheritance.

8. Practical application of genetics in agriculture, in poultry and farm animals.

Books :

Sinnot, Dunn & Dobzhonsky : Principles of Genetics.

D. M. Bonner : Heredity.

E. C. Colin : Elements of Genetics.

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Ecology, Physiology and Evolution :

A. ECOLOGY

1. Study of the physico-chemical factors such as light temperature, humidity, water, chemicals (Carbon, nitrogen, phosphorus etc.).

2. Study of biotic factors : Plants and animals.

3. Animal associations : Various forms of symbiosis and antagonism.

4. Population : Structure and organisation.

5. Community : Structure and organisation.

6. Ecosystem : (*a*) Dynamics of an ecosystem, (*b*) Productivity in an ecosystem and (*c*) Succession, climax and biomes.

7. Habitat ecology : (*a*) Freshwater, (*b*) Marine and (*c*) Terrestrial.

8. Practical applications in fisheries Management and Wild Life conservation.

Books :

G. L. Clarke : Elements of ecology.

E. P. Odum : Fundamental of ecology.

Dowdswell : Practical ecology.

B. PHYSIOLOGY

(i) Nutritional and Reproductive Physiology with reference to human population problems.

A study of the vital functions of animals :

(*a*) Feeding and nutrition
(*b*) Respiration
(*c*) Circulation
(*d*) Excretion and osmoregulation
(*e*) Neuromotor system
(*f*) Reproduction
(*g*) Endocrine system and
(*h*) Behaviour.

Books :

W. B. Yapp : Introduction to Animal Physiology.

B. T. Scheer : Animal Physiology.

E. Baldwin : An Introduction to Comparative bio-chemistry.

C. EVOLUTION

1. Evidences for Evolution.
2. The Origin of Adaptations—Natural Selection.
3. Darwinism, Neo-Darwinism and the modern synthetic theory.
4. The genetic basis of evolution. The Hardy-Weinberg Law.
5. Species : Definition and Structure.
6. Modes of speciation (*a*) Allopatric speciation
   (*b*) Sympatric speciation.
7. Origin of Higher Categories.
8. Man's place in nature. Biological and cultural factors in human evolution.

Books :

G. G. Simpson : The Meaning of Evolution.

E. O. Dodson : Evolution-process and Product.

J. S. Huxley : Evolution in Action.

PRACTICAL

Invertebrata and Chordata :

1. *Field work :* The local invertebrate and vertebrate fauna shall be studied regularly and a field note book maintained by each student. A representative collection of a minimum of 15 Zoological specimens five of which should be microscopic preparations must be submitted for valuation.

2. General dissections to study the internal anatomy of the following animals : Earthworm, Cockroach, Pila, F. W. Mussel (nervous system excluded), Prawn or Crab (Appendages only), Scorpion, Millipede (mouth parts only). Microscopic preparations of the above mentioned animals should also be made.

3. Dissections and microcopic preparations of the following animals will be expected : Shark, frog, caloted, pigeon (Demonstration only) and rat.

4. Study of the Vertabrate, girdles, limbs and skulls of the vertebrate series.

5. A knowledge of the preparation of permanent slides and sections is expected.

Embryology :

1. Examination of the invertebrate larval forms in the plankton.

2. Slides of chick embryos.

3. Incubating eggs and observing development (Demonstration only).

Cytology :

1. Preparation of Chromosomes in the salivary glands of Chironomus larvae.

2. Different stages of mitosis in onion root-tip squash.

3. Meiosis in grasshopper testis.

Genetics :

1. Demonstration of blood group testing.

2. Demonstration of polygenic characters. Height and weight of the students of the class.

3. Simple experiments usink Drosophila.

Ecology :

The class may be divided into smaller groups and each group assigned a particular habit for study and periodical recording of the observations and collections made.

Physiology :

A. The following Simple experiments may be done by the students individually

1. Action of salivary amylase.

2. Qualitative detection of urea, uric acid and ammonia in animal excreta.

3. Preparation of haemin crystal.

4. Qualitative tests for carbohydrates, fats and proteins.

B. The following experiments are to be demonstrated :

1. Muscle twitch-Demonstration and recording.

2. Effect of temperature on F. W. Mussel cilary action or heart beat in Daphnia.

3. Capillary circulation of blood in frog's web or tadpole tail or cockroach wing.

4. Simple reflex action.

The following shall be done and recorded :

Evolution :

1. Variations in characters like height, length of shells etc.

2. Adaptive radiation in limbs of mammals or beak of birds.

3. Simple experiments with coloured beads to show the action of Natural Selection and Genetic drift.

In addition to the Laboratory record of Practical work done, minimum of 15 representative Zoological specimens and slides should be submitted along with the field note book. Marks will be divided as follows :

Laboratory Record	..	25 marks.
Specimens and Slides	..	15 marks.

Branch VII—Geology Main

Written I

Section A : Geomorphology :

Geomorphic agents and processes ; Manner and results of their action on the topography.

Weathering : processes, climatic influences and products.

Mass wasting : slow and rapid processes.

Ground Water : source, water table ; descent of ground water ; porosity, permeability ; springs ; artesian wells ; geysers ; erosion and deposition.

Rivers : Source, rain-wash ; processes of river erosion ; base level of erosion ; graded streams ; processes of transportation and deposition ; valley development ; waterfalls ; meanders ; peneplains ; deltas ; alluvaial fans and cones. Drainage systems ; Differential stream erosion ; rejuvenation ; fluvial cycle in humid and arid regions.

Wind : Geological action ; landforms.

Sea : Movements ; erosion ; transportation and deposition ; resulting landforms. Shoreline development. Coral reefs and their origin and distribution ; submarine canyons.

Glaciers : Types and movements ; surface features and geological action ; causes of glaciation glacial product.

Lakes and Swamps : types and origin ; lacustrine deposits.

Geomorphic divisions of India.

Section B : Crystalography :

Definition and scope ; crystalline and amorphous ; morphological characters of crystals ; symmetry ; forms ; interfacial angles and their measurements ; classes of symmetry ; crystallography axes ; system of crystallization ; axial ratios ; parameters ; indices ; zones ; laws of crystallography ; elementary knowledge of crystal structure.

Holohedral, hemihedral and hemimorphic forms and combinations under each of the systems of crystallization as given below :

Cubic : Normal, pyrithodral, tetrahedral and plagiohedral.

Tetragonal : Normal, tripyramidal, pyramidal, hemimorphico sphenoidal and trapezohedral.

Orthohombic : Normal hemimorphic and sphenoidal.

Monoclinic : Normal.

Triclinic : Normal.

Hexagonal : Normal, hemimorphic, tripyramidal, pyramidal' hemimorphic, trapezohedral, rhombohedral, hemimorphic, trihombo-hedral and trigonal trapezohedral.

Important imperfections and irregularities in crystals : Twinning laws of twinning ; important twins occurring in each system of crystallisation.

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Written II

Section A : General Geology : (Cosmogony) :

Solar system : Position of the Earth in the Solar system ; size and density of the Earth.

Origin of the Earth : Hypotheses of Laplace, Chamberlain, Monlton, Jeffery and Cloud Dust.

Age of the Earth.

Atmosphere : Composition, height, density, pressure, temperature, moisture and movements ; weather ; Earth's movements and ; weather ; Earth's movements and its effects on atmosphere.

Climates : Their Causes and distribution.

Hydrosphere : Composition, extent,distribution and movements.

Lithosphere : Composition and general characters ; mode of occurrence of rocks.

Volcanoes : Types, products, distribution and origin.

Earth quakes : Types, effects, distribution and origin, seismograph.

Interior of the Earth.

Isotasy : Geosynclines ; island arcs Evolution of continents and ocean floors ; land bridges ; continental drift.

Section B : *Palaeontology :*

Divisions : Scope ; relation to other disciplines ; Fossils ; condition and modes of preservation ; uses of fossils.

General classification of animals and plants relevant to the study of fossils.

Invertebrates : General characters, classification, evolution and distribution in past geological periods of the following : Protozoa, Porifer, Craptolites, Corals, Bryozoa Brachiopoda, Pelecypoda, Gasteropoda, Trilobita, Echinodermata.

Palaeobotany : General characters, classification, distribution in the past geological periods of the following : Thallophyta, Bryosphyta, Pteridophyta, Spermatophyta.

General principles of evoluations ; Palaeontological evidences.

Section C : *Mineralogy (Physical) :*

Definition of a mineral : Silicates and non-silicates ; rock-forming and economic minerals ; Physical properties and their determination ; form, structure and imitative shapes.

General principles of Chemistry as applicable to mineralogy : Isomorphism, dimorphism, isodimorphism, polymorphism, pseudomorphism and paramorphism.

Study of the more important members of the following groups in relation to the physical properties and chemical composition, Quartz, Felspar, Felspathoid, Pyroxene, Amphibole, Mica, Garnet, Olivine, Zeolite and Epidote.

Study of other commonly occurring rock-forming minerals in relation to physical and chemical composition, distribution in India and uses of the ores of the following :

Gold, Copper, Aluminium, Iron, Manganese, Chromium Magnesium, Lead, Silver, Zinc and Titanium.

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Written III

Section B : *Economic Geology* (Processes and Industries) :

Outline of the historical development of Economic Geology.

General distribution of elements in the crust of the Earth ;

Origin of mineral deposits : Primary and secondary, secondary enrichment ; oxidation and supergne enrichment residual deposits ; mechanical concentrates ;

Bases of classification of economic mineral deposits ; Lindgren's classification.

Natural fuels : Coal and Petroleum.

Study of the raw materials required for the following : Ceramic, Refractory, Abrasive, Pigments, Precious and Semiprecious stones, cement, Building stones, Fertilizers and Mica.

Section C : Strucrural Geology :

Maps : Base maps ; methods of representing physiographic features ; contours ; topographic maps.

Attitude of beds ; dip and strike ; trends of out crops ; simple problems involving dip, apparent dip, thickness of beds and width of outcrops ; Maclaren's Rule.

Folds : Flowage and fracture ; types of folds ; general characters ; causes and effect of folding ; recognition of folds in fields and in geological maps.

Joints : General features, classification.

Faults : General characters, types, classification, causes and effects on outcrops, recognition of faults in field and in geological maps.

Unconfirmity ; General characters, types and recognition. Their significance in historical geology.

Inliers and outliers.

Mountains ; Orogenesis and Epierogenesis ; their causes and effect on physiography ; principal mountain chains.

Dams and Reservoirs; Geological conditions for their equipments.

Field Geology : Elements of surveying ; field equipments.

Section A : Stratigraphy and Indian Geology :

Historical development ; Laws of Stratigraphy ; Development of geological time scale ; significance of unconformities ; imperfections of geological record ; facies and facies changes ; correlation.

Indian stratigraphical scale ; the principal stages, formations and lithology of the following :

Archaeans ; Dharwars ; Puranas ; Cuddaapahs and Vidhyans. Lower Palaeozoic ; Cambrian, Ordovician and Silurian ; Upper Palaezoic ; Devonian and Lower carboniferous. Gondwana System ; Permo — Carboniferous system ; Triassic system ; Jurassic System ; Cretaceous System ; Deccan Traps and associated sediments aries ; Eocene and Paleocene ; Oligocene and Lower Miocene ; Siwalik System ; Plistocene ; Recent.

Life, climate and principal events connected with the above eras.

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Written IV

Section A : Petrology :

Definition and scope of the subject ; Igneous rocks ; distribution of rocks.

Igneous rocks ; plutonic, pypabyssal and volcanic ; forms of intrusive and extrusive types ; structures and textures ; general chemical and mineral composition of igneous rocks.

Principles of classification of igneous rocks ; outlines of the classification of CIPW, Zirkel-Rosenbusch and Johannsen ; elementary acquaintance with Shand's and Niggli's classifications.

Crystallization of metals ; congruent and incongruent compounds ; crystallization of uni-component (binary) with simple eutectic (Diopside-Anorthite etc.) binary with an intermediate incongruently melting compound (Forsterite-Quartz), binary with two incongruently melting intermediate compounds (Pottasium Silicate — water) and binary with infinite number of intermediate incongruently melting compounds (Albite — Anorthite) : their application to petrogenesis.

General idea of Bowen's Reaction Principle.

Differentiation in igneous rocks ; fields evidences for differentiation processes of differentiation ; crystallization of basalitic magma ; origin of different rock families and types.

Alkaline rocks ; their distribution, association and origin.

Role of volatile constituents ; formation of pegmatites ; assimilation ; petrographic provinces.

Sedimentary rocks : Weathering, decomposition and disintegration ; transportation and deposition ; sources and types of sedimentary rocks ; sedimentary textures and structures ; composition of sedimentary rocks ; classification into residual, physically transported, chemical and organic.

Methods of study of sediments and sedimentary rocks ; heavy mineral analysis.

Metamorphic rocks : Agents and kinds of metamorphism ; meta--morphic minerals, textures and structures, Grubenmann's metamorphic zones ; metamorphic changes of rocks under cataclastics, thermal, dynamo-thermal and plutonic conditions ; additive metamorphism ; granitization ; charnockites.

Section B : Optical Mineralogy :

General principles of optics ; light as a wave motion ; law of reflection and refraction ; total internal reflection and critical angle, double refraction ; polarisation ; Brewster's Law ; interference ; construction of nicol prisim ; simple petrological microscopic.

Flecher's indicatrix ; Indicatricies of crystals of different crystal systems ; knowledge of isotrophic, uniaxial and biaxial indicatricies.

Preparation of thin sections of minerals ; study of thin sections under the petrological microscope ; colour and absorption ; refractive index and Becke's Test ; interference colours ; application of colour chart.

Microscope accessories ; quartz wedge and gypsum plate ; their uses in determining the order of interference colours and sign of elongation.

Elementary knowledge of interference figurds and dispersion of optic axes ; optical properties of non-opaque minerals. Typical optical anomalies.

Crystallography :

Drawing of the clinographic projection of the following :

Isometric : Cube, octahedron, dodecahedron, tetrahexahedron, Repetition, trapezohedron, trisoctahedron, and hexoctahedron.

Pyritohedron, diploid, tetrahedron (positive and negative), trigonal tristetrahedron, tetragonal tristetrahedron and hextetrahedron.

Tetragonal : First order prism and base, second order prism and base, ditetragonal prism and base, first order pyramid, second order pyramid, ditetragonal pyramid ; zircon, rutile, vesuvianite, cassitetrite and apophyllite.

Third order pyramid and base, third order pyramid.

Sphenoid, tetragonal scalenohedron.

Orthorhombic : Barite, staurolise, olivine and sulfur.

Monoclinic : Augite, Orthoclase, Gypsum and Hornblende.

Hexagonal : Beryl Rhombohedron, calcite (Nailheaded spar) and dogtoc spar, tourmaline.

Physical Mineralogy :

Study of minerals belonging to the different groups listed under Mineralogy in Written I.

Study of common minerals of economic importance.

Optical Mineralogy :

Microscopic study of the following minerals : Quartz, Orthoclase, Microcline, Albite, Oligoclase, Labra dorite, Leucite, Nepheline, Hypersthene, Augite, Diopside, Aegerite, Hornblende, Actinolite, Tremolite Glaucophane, Olivine, Garnet, Tourmaline, Zircon, Topaz, Sphene, Epidote, Andalusite, Sillimanite, Kyanite, Staurolite, Muscovite, Biotite Serpentine, Chlorite, Calcite and Apatite.

Chemical Minaralogy:

Identification of the following mineral powders by simple blow pipe tests. Apatite, Arsenopyrite, Barites, Bauixte, Calcite, Celestite, Cerussite, Chalcopyrite, Chromite, Fluorite, Falena, Gypsum, Haematite, Ilmenite, Limonite, Magnesite, Magnetite, Malachite, Orpiment, Psilomelane, Pyrite, Pyrolusite, Realgar, Rhodochrosite, Rutile, Siderite, Smithosonite, Sphalerite, Strontianite, Witherite and Wolframite.

Preparation of maps of India showing occurrences of Chief economic minerals.

Palaeontology :

Study and neat drawing of the following fossils :

Invertebrates

Protozoa : Orbitolites, Alveolina, Textularia, Lagena, Nodosaria, Globigerina, Rotalia, Fusilina, Nummulies and Operculina.

Porifera : Ventriculties and Siphonia.

Coelenterata : Didymograptus, Phyllograptus, Tetragraptus, Dipligraptus, Monograptus, Rastrites ; Cystiphyllum, Calceola, Holiophyllum, Zaphrantis, Lithostrotion, Montlivoltia, Isastracea, Phecosmalia, Cyclolites, Syrnigopora, Favosites, Heliolites, Halysites.

Echinodermata : Cidaris, Hemicidaris, Holaster, Micraster, Hemiaster, Stigmatopygus, Encrinus, Marsupites, Apiocrinus and Pentacrinus.

Brachiopoda : Lingula, Lingulella, Productus, Chonetes, Stigmatopygus, Encrinus, Marsupites, Apiocrinus and Pentacrinus.

Pelecypoda : Nucula, Leda, Arca, Glycimeris, Modiola, Pinna, Inoceramus, Pseudomonotis, Spondylus, Plicatula, Pecten, Lima, Vola, Aviculopecton, Ostrea, Alectryonia Gryphaea, Exogyra, Trigonia, Unio, Astarte, Cardita, Diceras, Hippurites, Radiolites, Megaloden, Cardium, Venus, Meretrix, Carbula, Pholadomya.

Gasteropoda : Pleurotomaria, Bellorophon, Eumphalus, Turbo, Trochus, Natica, Turritella, Cerithium, Cypraea, Murex, Fusus, Voluta, Conus, Physa, Limnaea, Helix.

Cephalapoda : Orthoceras, Nautilus, Goniatites, Ceratites, Phylloceras, Lytoceras, Stephenoceras, Macrocephalites, Perlsphinctus, Acanthoceras, Scholoenbachia, Macroscaphites, Hamites, Baculites, Scaphites, Turrilites, Belemnites.

Trilobita : Trinucleus, Olenellus, Paradoxides, Olenus, Calymene, Asaphus, Phacops.

Plant Fossils

Pteridosperms : Glossopteris, Gangamoptris, Vartebrania, Thingeldia.

Cordatales : Noeggerathiopsis, Dadoxylon.

Equisitales : Schizoneura, Phyllotheca, Calamites.

Filicales : Alethopteris, Cladophylebis.

Sphenophyllales : Sphenophyllum, Taeniopteris, Ptillophyllum, Otozamites.

Coniferales : Voltzia, Elactocladus.

Algae : Dissocladella, Acicularia, Neomeris.

Angiosperms : Nipadities, Palmoxylon.

Lycopodiales : Lepidodendron, Sigillaria, Stigmaria.

Petrology : Megascopic and microscopic study of the petrographic features of the following rock-types and their variations.

Igneous : Granite, Pegmatite, Aplite, Felsite, Rhyolite, Obsidian, Grano-diorite, Dacite, Diorite, Andesite, Syenite, Trachyte, Nepheline, Syenite, Phonolite, Monozonite, Gabbro, Dolerite, Basalt, Pyroxenite, Dunite, Peridotite, Anorthosite.

Sedimentary : Conglomerate, Breccia, Arkose, Sandstone, Shale, Limestone.

Metamorphic : Schist, Gneiss, Slate, Granulite, Quartzite, Marble, Eclogite, Charnockite, Khonodolite, Gondite.

Structural Geology : Exercises in plotting of out-crops on contour maps ; study of geological maps relating to thickness of beds, unconformity simple folds, simple faults and igneous intrusions.

Construction of sections to bring out the structures ; Interpretation of maps.

Geology of India : Drawing of maps of India, showing the following :

Mountain systems of India.

Rivers of India.

Distribution of outcrops of the Principal Geological formations era-war.

Field Geology : Use of clinometer compass : field techniques of study : acquaintance with the principal geological formations of the Southern states, through field trips, under guidance of teacher limited to three weeks ; preparation of geological reports.

Books recommended for study and reference

Holmes, A. :	Principles of Physical Geology	English language Publishing Society
Emmons & others :	Principles of Geology	McGraw Hill
Woods, H. :	Palaeontology	Cambridge University Press
Krishnan, M.S. :	Geology of India & Burma	Higginbothams
Wadia, D.N. :	Geology of India	Macmillan
Dana :	Mineralogy	Asia Publishing House
Rutley :	Mineralogy	Murby
Tyrell, G.W. :	Principles of Petrology	Asia Publishing House
Harker, A. :	Petrology for Students	Macmillan
Mukerjee, P.K. :	Text-book of Geology	World Press
Plint, Y. :	Essentials of Crystallography	Peace Publishers
Betekhatin, A. :	Mineralogy	Peace Publishers

Kreiter, V.M. :	Geological Prospecting and Exploring	Mir Publishers
Zubkov, V. :	Petrography	Mir Publishers
Miller, W.J. :	Physical Geology	East-West
Worcester, P.G. :	Geomorphology	East-West
Smith, H.G. :	Minerals under Microscope	Murby
Bateman, A. :	Formation of Mineral Deposits	Wiley
Wadia, Mrs. :	Minerals of India	National Book Trust
Rogers & Kerr :	Optical Mineralogy	McGraw Hill
Winchel, A.N. :	Optical Mineralogy Parts I & II	Wiley - Eastern
Naidu, P.R.J. :	Johannesen's Optical Mineralogy	Allied Publishers
Chiplonker G.W. :	Geological Maps	Dastane Bros
Metha, R.L. :	Physical Geology	Harichand Metha Jammu
Sharma, N.L. & Ram, K.S.V. :	**India's Economic Minerals**	**Dhanbad Publications**

B.Sc.

Group B—Ancillary Subject

Branch I—Mathematics Main

(Ancillaries)

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PHYSICS

Only C.G.S. system of units should be employed.

Mechanics : Velocity—time curve, Parallelogram law of velocities and acceleration, uniform circular motion, simple harmonic motion, period and frequency of SHM—Composition of SHMs in a sttaight and at right angles.

Forces, moments, couples. Requisites of a physical balance, Friction, Laws of friction, Limiting friction, Coefficient of friction, determination of Coefficient of friction. Elasticity, Hooke's Law, Moduli — Determination of Young's Modulusly Stretching.

Archimede's Principle applied to gases. buoyance, Stability of floating bodies, floating of ships, plimsol lines, Atmosphere, Atmospheric pressure. Rotary pump, Centrifugal pump, diffusion pump, Mcleod gauge.

General Physics : Surface tension, Surface energy, Capillary rise, determination of surface tension-capillary rise, drop weight method and torsion balance, surface films, Molecular layers.

Viscosity — Coefficient of viscosity, experimental determination of v scosity by capillary flow — comparison of viscosities, Ostwald viscometer.

Omosis, osmotic pressure, experimental determination of osmotic pressure, vapour pressure of solutions — Boiling and freezing points.

Diffusion, Graham's and Fick's laws of diffusion, Experimental determination of the Coefficient of diffusion, analogy with heat conduction.

Heat : Thermometry — Resistance thermometer — thermo electric thermometer-disappearing flament pyrometer — Constant volumes hydrogen thermometer.

Determination of linear expansion of a solid by optic levear method, apparent expansion of a liquid and absolute expansion of a liquid by Dullong and Petit's and Regnault's methods.

Determinations of sp heats of solids and liquids by the method of mixtures — Barton's method for radiation correction (theory only) Bunsen's ice Calorimeter, Berthelot's calorimeter, Cp and Cv — their determination.

Postulates of Kinetic theory of gases, expression for pressure, gas laws, Avagadro hypothesis, Graham's law, Amaga's and Andrew's experiments Van der Waal's equation — critical constants. Liquefaction of gases — Joule Kelvin effect. Porous plus experiment. Low temperature, Refrigerator, Airconditioner.

First law of thermodynamics — Determination of J. Searle's method, Callendar and Barne's method. Isothermal and Adiabatic changes — Ratio of Specific heats, clement and Desorme's method. Second law of Thermodynamics, Heat engines, Carnot's engine, Efficiency, Indicator diagram, Carnot's theorem — Kelvin's scale of temperature.

Transmission of heat — conductivity, Searle's and Lee's methods, Prevosts theory, Stefan's law (statement only), Newton's law, veri - cation sp. heat of liquid by cooling, Bolometer, Solar Constant, pyrometer.

Sound : Simple ideas of harmonic vibrations and forced harmonic vibrations and waves — forced harmonic vibrations (no derivations), resonance Lissaju figures.

Velocity of sound in air, its dependency on temperature. Pressure and humidity. Progressive and stationary waves (no derivations). Reflection and refraction of sound Acoustics of buildings. Vibrations in air columns, open and closed pipes, overtones. Deter-- mination of velocity of sound in air by resonance. Transverse vibrations of strings, Sonometer. Sound recording and reproduction ultrasonics.

Light : Luminous intensity, Intensity of illumination, Photometry, Rumford, joly and Lummer-Brodhum photometers. Deviation of reflected ray by Rotating mirror, Sextant, Single optic lever. Refraction through glass slab — expressions for lateral and normal shifts, actual and apparent depth — determination of refraction index of solid and liquid by microscope, critical, angle, air cell. Spectrometer — determination of μ of solids and liquids. Determination of local length of lens, auxiliary lens method, conjugate foci method. Relation between μ f and R. Liquid lens. Combination of lenses in contact. Focal power. Gregory's reflecting telescope. Astronomic refracting telescope. Travelling microscope, Biological

microscope. Epidiascope. Dispersion, radiation and absorption spectra. Fraunhofer lines, explanation. Scattering, molecular spectra, Raman effect.

Velocity of light, Fizeau and Foucault methods — their significance. Theories of light, Newton's corpuscular and Huygen's wave theory. Fresuel's explanation of rectilinear propagation of light. Interference Young's experiment, Fresnel's biprism, Newton's Rings experiments (reflected light). Colours of thin films, testing of planeness of surfaces Diffraction, rectangular aperture, transmission grating — grating spectrometer, Polarisation by reflection and refraction, Brewster's law, Double refraction, Nicol, Polaroid. Rotation of plane of polarisation — half shade polarimeter.

Magnetism : Intensity of field at any point — Comparison of magnetic moments deflection of magnetic moments, Tan-A and Tan-B positions Vibration magnetometer—measurement of M and H verification of inverse square law Magnetic properties of materials, intensity of magnetisation, susceptibility and permeability, hysterists, 1 - H curves, their applications. Basic concepts of ferro, dia and para magnetism. Earth's magnetic elements, dip circle.

Electricity : Induced charges, charging by induction, distribution of charge on conductor, action of points, lighting conductor, electrophorus, Van de graff generator. Couloub's law of inverse squares, Electrostatic unit of charge. Electric field and potential. Condensers, charging, capacity, action of condenser, Parallel plate condenser, electrolytic and paper condensers.

Solenoid, Ohm's law and its applications. Post Office box, Potentiometer, Electrolysis Arrhenius theory, conductivity Kohlrausch bridge, accumulators — Lead accumulator, Edison cell, Cadmium cell, Force on a current carrying conductor in a magnetic field, Fleming's Left hand Rule, Moving coil galvanometer. Thermo electric effect. Laws of electro magnetic induction, Lenz's law, self and mutual inductances, induction coil eddy current, induction furnace Transformers, Power transmission.

Modern Physics : Discharge of electricity through gases — Thomson's experiment for e/m and Millikan's experiment for 'e' of the electron X-rays, production by coolidge tube, Properties and uses. Photo electric emission, Quantum theory, Photo-electric cell, its applications. Radio activity — natural, artificial and induced α, β, rays, properties and uses. Nuclear, fission, Nuclear reactor, Energies of the future. Simple ideas on cosmic radiation. Simple ideas on the dual nature of matter, Electron microscope. Thermionic emission — diodes and triodes, Triode characteristics. Simple ideas on modulation amplification and detection. Single triode receiver. Full wave diode rectifier. Cathode ray oscillograph. Mass energy equivalance. Einstein (no derivation).

Experiments:

1. Spherometer.
2. Young's Modulus by stretching.
3. Surface tension Capillary rise.
4. Surface tension — torsion balance.
5. Surface tension drop Wight method and interfacial tension.
6. Viscosity — capillary flow.
7. Comparison of viscosities.
8. Linear expansion — optic lever.
9. Constant volume air thermometer.
10. Specific heat of solid — mixtures.
11. Specific heat of liquid — mixtures.
12. Latent heat of ice.
13. Latent heat of steam.
14. Newton's Law of cooling — verification.
15. Specific heat of liquids — by cooling.
16. Thermal Conductivity — Searle's method.
17. Thermal Conductivity — Lee's method.
18. Refractive index of solids and liquids — Microscope.
19. Concave and convex lens — focal length conjugate foci graphical method).
20. Spectrometer — Refractive index of prism.
21. Spectrometer — Hollow prism.
22. Liquid lens.
23. Standardisation of grating — spectrometer.
24. Wavelength of light — grating spectrometer.
25. Newton's rings reflected system.
26. Polarimeter.
27. Defl ction magnetometer — Comparison of Moments. Tan — A position.

28. Deflection Magnetometer — comparison of Moments Tan — B position.

29. M & H — Vibration and deflection magnetometers.

30. Post Office box — Temperature coefficient.

31. E.C.E. of copper.

32. Resistance of mirror galvanometer (Not table galvanometer) Half deflection method.

33. Figure of merit of mirror galvanometer (No table galvanometer).

34. Kohlrausch Bridge.

35. Potentiometer — Calibration of Ammeter.

36. Potentiometer — Resistance.

37. Potentiometer — Calibration of Voltmeter (low range only).

38. Potentiometer — Internal resistance of a cell.

39. Sonometer.

40. Resonance.

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CHEMISTRY

(Ancillary)

General and Physical

Laws of chemical combination. Dalton's atomic theory. Avogadro's hypothesis. Atoms and molucules Combining weight, atomic weight and molecular weight.

Gas laws : Boyle's, Charles's, Dalton's, Graham's General gas equation. Kinetic theory. Imperfections in gas behaviour. Van der Waals equation od state (derivation not expected). Liquification of gases. Critical constants. Liquids, vapour pressure, boiling point. Solutions of solids, liquids and gases in liquids. Determination of solubility and solubility curve. Significance of solubility curves. Henry's law. Supersaturation.

Determination of molecular, equivalent and atomic weights :

(*a*) Molecular weights :

(i) From densities of gases and vapours. Method of limiting density. Regnault, Dumas, Victor Meyer and Hoffman methods. Abnormal vapour densities. Dissociation.

(ii) From Graham's law of diffusion.

(iii) From osmotic pressure, cryoscopic and ebullioscopic methods (Raoult's law). Abnormal molecular weights.

(*b*) Equivalent weights. Determination of equivalent weights.

(*c*) Atomic weights — Methods of Cannizzaro, Dulong and Petit Mitscherlich.

The structure of the atom. Valency : Classical and electronic theories.

Classification of elements. Metals, non-metals and metalloids. Classification by Dobereiner, Newlands, Mendeleff and Lothar Meyer. Modifications.

Exothermic and endothermic reactions. Heats of solution and neutralisation. Reversible reactions and the Law of mass action. Verification of the law in simple systems : application to hydriodic acid, phosphorus penta-chloride and dinitrogen tetroxide.

Catalysis : Haber and contact processes. Electrolysis and its applications. Faraday's laws and applications. Theory of electrolytic dissociation. Equivalent and molecular conductivities. Degree of dissociation. Acids, bases and salts. Hydrogen ion concentration.

Colloids : Preparation and properties.

Inorganic Chemistry

Oxygen : Preparation, manufacture, properties and uses. Oxides and their classification.

Hydrogen : Preparation, manufacture, properties and uses. Heavy hydrogen.

Water : Hard and soft waters, methods of softening Composition by weight and by volume. Hydrates, efflourescence and deliquescence.

Ozone and Hydrogen-peroxide : Preparation, properties and uses. Oxidation and reduction. Formulae.

Halogens : Comparative study of fluorine, chlorine, bromine, iodine, and their hydrides. Oxides and oxy-acids of the halogens and their salts. Bleaching powder. Chlorate, bromate and iodate of potassium. Potassium perchlorate.

Sulphur — Extraction, allotropie modifications. Hydorgen sulphide. Metallic sulphides, their solubilities and application in qualitative analysis.

Sulphurous, sulphuric, thiosulphuric acid and their salts.

Nitrogen — The composition of the atomosphere. Preparation and properties of nitrogen, oxides of nitrogen, nitrous acid and nitric acid. Action of nitric acid on metals and non-metals.

Phosphorus : Extraction, allotropic modifications, uses. Phosphine. Chlorides oxides ; phosphrous and phosphoric acids.

Arsenic, antimony and bismuth : Comparison ; oxides, hydrides, chlorides and sulphides. Arsenites and arsenates.

Carbon : Allotripoc forms, carbon monoxide, carbon dioxide, carbon disulphide, phosgene. Carbonates and bicarbonates.

Boron and Silicon : Boric acid, sodium borate, boron trifluoride. Silicon dioxide, silicic acid and silicon terrafluoride. Alkali silicates.

A study of the following metals from the stand point of the periodic tables : Na, K, Mg, Ca, Ba, Sr, Zn, Cd, Hg, Al, Sn, Pb, Cu, Ag, Cr, Mn, Fe, Co, Ni. A general outline of the preparation of the metals fron their oxides, hydroxides and sulphides. Oxides, hydroxides, carbonates, chlorides, nitrates, sulphides and sulphates of metals.

Organic Chemistry

Purification of organic compounds. Detection and estimation of carbon, hydrogen, nitrogen, chlorine and sulphur. Empirical and molecular formulae. Paraffin hydrocarbons upto pentane. Homologous series. Polyhalogen derivatives of methane, ethane. Alcohols upto butyl alcohols. Ethers. Aldehydes and ketones. A comparative study of acids up to butyric acids. Chlor-acetic acids. Acid chlorides, anhydrides, amides, and esters. Nitro methane, ethyl nitrite and dimethyl sulphate. Primary, secondary, tertiary amines. Quaternary salts. Dibasic acids upto succinic acid. Lactic amd tartaric acids. Optical isomerism. Fumaric and maleic acids. Geometrical isomerism. Glycol and glycerol. Glucose, fructose, cane-sugar-properties, reactions and methods of differentiation.

Benzene, toluene and naphthalene. Chlorination, nitration and sulphonation of benzene and toluene. Benzaldehyde, benzoic acid and derivatives of benzoic acid. Aniline, diazotisation and

reactions of diazomium salts. Acetophenone, benzophenone, Benzyl alcohol, phenol, anisol, picric acid and salicylic acid. Phthalic acid, phthalimide and phenolphthaen.

Practical

Qualitative analysis of a simple salt. The following exercises in volumetric analysis : (The students should do their own weighings).

1. Standardisation of an acid against sodium-carbonate.
2. Standardisation of alkali against oxalic acid.
3. Standardisation of potassium permanganate.
4. Standardisation of thiosulphate against dichromate.
5. Estimation of ferric and ferrous iron (external indicator).
6. Estimation of coppr or a solution of a copper salt.
7. Estimation of silver nitrate against sodium chloride.

Recommended for reference :

Prescott : Intermediate Chemistry (U.T.P.)

Lowry and Cavell : Intermediate Chemistry (MacMillan).

Holmyard : Inorganic Chenistry (Arnold).

Holmyard : Organic Chemistry (Arnold).

Philbrick : Inorganic Chemistry (Bell).

Durrant : General & Inorganic Chemistry (Longmans).

Durrant : Organic Chemistry (Longmans).

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Statistics I

(Syllabus)

Scope of Statistical methods : Collection o data ; Classification ; Sample and census.

Tabulation : Graphical and diagramatic representation.

Averages : Measures of Dispersion ; Moments ; Measures of skewness ; and curve fitting : Method of least squares ; (straight line, Parabola and logarithmic curves).

Association of Attributes : Coefficient of association, correlation and regression : correlation ratio.

Linear Interpolation : Newton's and Lagrange's formulae ;

Divided Differences.

Index numbers Moving averages : Time series, construction of mortality table and application to Life Insurance Statistical Quality control. Principles and construction of control charts.

Application of statistics to genetics.

Statistics II. (Treatment as in Weatherburn : Statistics).

Rules of Probability : Addition and multiplication : Expectation Moment Generating function : Properties Theoretical Distributions : Binomial, Poisson ; Normal Properties ; Importance.

Sampling distribution : Large and small samples : Texts (Proportion ; Mean ; Std Devn ; Correlation coef).

Uses of X^2, t. and F tests for independence. Analysis of variance ; Randomised blocks ; Latin square : Planning of scientific experiments ; Principles of Experimentation. Applications to Agricultural statistics.

List of Practical Exercises :

Practical instruction must provide for the use of desk calculations and statistical tables. Desk calculation will not however be necessary for answering the practical paper in the examination.

1. Formation of frequency table with 500 observations.
2. Simple graphical representation : Bardigrams, Pie diagrams, Histograms, frequency Polygon, frequency curves.
3. Cumulative curves ; ogives ; Lorenz curve.
4. Calculation of averages.
5. Measures of Dispersion ; coefficient of variation.
6. Measures of skewness ; Moments ; Kurtosis.
7. Curve fitting : By Method of Least squares : St. Line fit. Parabola fit ; Curves of the form $y = ae^{bx}$; $y = ab^{x}$;
8. Scatterdiagram ; formation of Bivariate frequency table.
9. Calculation of correlation coefficient : Regression lines.

10. Calculation of correlation ratio.

11. Association of attributes : Coefficient of association.

12. Fitting of Binomial Poisson curves.

13. Fitting of Binomial Normal curve.

14. Large Sample tests ; proportion.

15. Large Sample tests. Means : St. deviation.

16. Tests of independence contingency Table.

17. Tests of Goodness of fit X^2 test.

18. Analysis of Variance, Use of F test ; one way classification.

19. Randomised slocks.

20. Latin squares.

Ancillary Statistics Paper I and II Questions to be Mathematical in nature and not descriptive.

Questions requiring involved numerical calculations are to be asked only in Practical paper.

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Numerical Mathematics

Construction and use of nomograms.

Nomograms for the solution of linear, quadratic and trigonometrical equations.

The use of a slide rule.

Graphical solution of problems ; logarithmic, semi-logarithmic, trilinear rulings.

Reference Books :—

Brodetsky S. : A First Course in Nomography.

John Maclean : Descriptive Mathematics especially Chapters I and IV.

John Maclean : Graphs and Statistics especially Chapter IX.

Whittaker and Robinson : Calculus of Observations, Chapter VI.

Whittaker and Robinson : Interpolation.

Numerical Mathematics

Syllabus

Paper I

Finite differences—operators E and $\triangle$; interpolation with equal intervals ; divided differences, horizontal and diagonal difference tables ; interpolation with unequal intervals ; central differences—Gauss, Stirling, Everett and Bessel's formulae. Inverse interpolation. Differences of Zero ; symbolic operators.

Nomography : Construction and use of monograms ; nomograms for the solution of linear, quadratic and trigonometrical equations.

Graphical solution of problems ; logarithms, semi-logarithmic, trilinear rulings.

The use of a slide rule.

Paper II

Numerical differentiation. Numerical integration, Simpson's three-eighths and Weddle's rules. Eulor Maclaurin formula, application to summation of series ; Newton—Cote's formula. Stirling's approximation for factorial.

Numerical solution of equations in one unknown Newton's approximation for determining roots ; use of calculus of differences—Horner's method.

Books for Study and Reference :

(Only relevant sections of the books need be used)

Freeman, H : Mathematics for Actuarial Students. Vol. II.

Whittaker, E. T. & Robinson, G. : The Calculus of Observations.

Steffensen, J. F. : Interpolation.

BrodetsEy, S. : A First Course in Nomography.

John Maclean : Descriptive mathematics (especially Chapters I and IV).

John Maclean : Graphs and Statistics.

Milne Thompson, L. M. : The Calculus of Finite Differences.

Branch III—Physics Main

(Ancillaries)

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Mathematics

Mathematics : Ancillary to Physics and Chemistry Main.

There shall be 2 papers of 3 hours' duration each at the end of the second year, each carrying 75 marks.

The subject are to be taught with greater emphasis on application to Physics or Chemistry.

Paper I

Algebra : Remainder Theorem and factorization. Index Laws. Surds. Logarithms and use of the slide rule. Quadratic equations. The 3 progressions. nPr, Nl, nCr. Binomial Theorem for a positive integer. Applications of Binomial theorem. Exponential and Logarithmic series. Solutions of Linear Equations in 2 and 3 variables. Determinants. Elementary Probability. Newton's and Horner's method of approximation to roots of an eqaution.

Calculus : Differentiation of x^n, Sin x, Cos x, ex, log x. Inverse function. Differentiation of sum, pr. quotient and simple function of a function. Differential co-efficient as a rate measurer. Successive differentiation. Simple examples on maxima and minima. Tangents and normals and curvature of plane curves. Partial differentiation — Notion of Differentials error and approximation.

Integration : Standard integrals ; Integration by simple substitution and by parts. Application to find length of arcs, areas, volumes, Centroid, M.I.

Differential equations : First order including the following type : 1. Variables separable ; 2. Homogeneous Equations ; 3. Linear Equations ; 4. Bernouillis' Equations.

Second Order : Linear with constant co-efficient. Applications to damped oscillations and Forced vibrations. Application for Fourier series.

Paper II

Geometry : Elementary properties of triangles, Parallelograms, trapeziums, and regular polygons of n sides. Simple solid figures, solid angles Tetrahedron, cylinder, cone, sphere, pyramid.

Analytical Geometry : Standard equations in rectangular co-ordinates straight line, circle, parabola, ellipse, hyperbola. Plotting of graphs.

$$y = \log^{x} \qquad y = e^{x}$$
$$Y = e^{-x}, \qquad Y = e^{-x^2}.$$

Trignometry : Sin $(A \pm B)$. Cos $(A \pm B)$, tan $(A \pm B)$
Sin $A \pm Sin\ B$, $Cos\ A \pm Cos\ B$.

Simple identities : Relation between sides and angles of a triangle. Solution of triangles. Solution of simple Trigonometrical equations of the type of a Cos Q + b Sin Q = o Complex numbers. Argand diagram. De. Moivre's Theorem and immediate applications. Series for Sin Q, Cos Q in powers of Q. Hyperbolic functions : Solution of the equation $X^n = a$.

Vector Analysis : Vectors, Scalar and Vector products. Scalar Triple product. Vector Triple products. Illustrations. Equations. to a line, plane and simple curves in vector notation.

Chemistry : The syllabus same as for Group B—chemistry under Br. I—Mathematics Main

(Vide Syllabus No. 33).

Branch IV—Chemistry

(Ancillaries)

(i) **Physics :** The syllabus same as for Group B— Physics under Br. I—Mathematics Main.
(Vide Syllabus No. 32).

(ii) **Mathematics :** The Syllabus same as for Group B — Mathematics under Br. III—Physics Main.
(Vide Syllabus No. 36).

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Botany

1. The structure and life-history of the following :—Bacteria, Oscillatoria, Nostoc, Chlamydomonas, Pandorina, Volvox, Ulothrix, Oedogonium, Ectocarpus, Polysiphonia, Chora, Rhizopua, Yeast, Pencillium, Puccninia, Agaricus, Usnea, Riccia, Funaria, Selaginella, Lycopodium, Cycas.

2. External morphology of flowering plants in general and a systematic study of the following natural orders together with the econpmic importance of those marked in asterisks :—

Anonaceae, Nymphaeaceae, *Leguminosae, *Malvaceae, *Rutaceae, Mytraceae, *Cucurbitanceae, *Rubiaceae, Compositae, Apocynaceae, Asclepiadaceae, Convolvulaceae, *Solanaceae, Acanthaceae, Labiatae, Amarantaceae, *Euphorbiaceae, Liliaceae, Musaceae, Orchidaceae *Palmae, *Gramineae.

3. *Plant Physiology :* Chemical composition of the plant. Soil and its nature, absorption of water and inorganic nutrients, osmosis, plasmolysis. Transpiration and factors affecting transpiration. Photosynthesis. Special methods of nutrition (heterotrophism) (parasitism, saprophytism, bacterial symbiosis, carnivory). Respiration.. Growth phrases and factors trophistic movement and movement — Geotropism, Phototropism and Hydrotropism.

4. *Histology :* Cell and its parts. Mitosis and meiosis. Meristem, primary and secondaiy tissues and their distribution in the angiospermous plant body (excluding anomallous types). Structure and development of the anther, development of male gametophyte. Structure and development of the ovule and the female gametophyte. Fertilization. Parts of the typical dicotyledonous and monocotyledonous embryo.

5. *Ecology :* Chief external and internal and physiological features of Xerophytes, Mesophytes and Hydrophytes with examples from local flora.

6. *General Principles :* Evolution and Heredity. A short account of the work of Lamarck, Darwin and de Vries Heredity — Mendel's Laws of Inheritance, Monohybrid ratio. Dihybrid ratio.

7. *Practical work :* Candidates are expected to be able to make preparations illustrating the form and structure of any plant of the orders or groups mentioned in the syllabus and to describe them with sketches sufficient for their identification ; to make dissection with the simple microscope of the floral parts of Phanerogams included in their syllabus and to make drawings, construct floral diagrams and refer them to their naturel orders ; to describe in technical language plants belonging to any of the orders of groups specified in the syllabus and to describe simple setups of physiological experiments. To make, strain, mount and examine through the compound microscope and identify preparations of plant material belonging to paragraphs 1, 4 and 5. At the practical examination each candidate must submit his laboratory note-book. The practical examination will be of three hours' duration.

Books Recommended :

For study :

1. Text-book of Botany by Lowson, Howarth and Warne-Oxford University Press.

2. Plant Kingdom by Brown-Ginn & Co., New York.

3. Structural Botany by Scott & Brooks, Volumes I and II—Macmillan & Co.

4. A Text-book of General Botany by Smith etc. — Mamillan & Co.

5. Introduction to Botany by Haupt — McGraw Hill.

6. Hand-book of Botany by Rangachary, Sekhar & Sarathy, P. Varadachari & Co.

References :

1. Cryptogamic Botany by G. M. Smith — Vols. I and II—McGraw Hill.

2. Text-book of Botany — Vols. I to III by Coulter, Barnes and Cowles.

3. Plant Anatomy by Eames and McDaniels—McGraw Hill.

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Zoology

Theory :

Invertebrata : A study of the following animal forms as illustrative of the main characteristics of the groups to which they belong.

Amoeba, Euglena, Paramecium, Plasmodium, Hydra Obelia, Aurelia, Parasitic Worms (Liver-fluke, Tape Worms and round Worms), Earthworm, Leech, Prawn, Centipede, Millipede, Cockroach, Scorpion, Freshwater mussle, Pila, Sephia and Star-fisk.

Chordata : A general survey of the chordata and the evolution of Vertebrate organs and organ systems with the anatomy of Shark, Frog, Calotes, Pigeon and Rabbit or Rat only as types for the various classes.

Embryology : Structure of the egg, cleavage and gastrulation processes in Frog, Chick and Rabbit.

General Principles : Evidences for evolution. Theories of Lamarck, Darwin and De Vries.

A brief reference to Mendel's experiments (Monohybrid and Dihybrid only) and Mendel's laws.

Practical :

Candidates will be required to identify and describe specimens and preparations relating to the types mentioned above. They will be required to dissect and make simple microscopic preparations of Earthworm, Cockroach, Fresh-water mussel, Frog, Calotes, Pigeon (Demonstration only) Crab and Rat.

Dissections of the nerves will be expected only in the case of Earthworm, Cockroach and Frog. External characters alone to be studied in the case of Prawn, Pila and Scorpion. Practical record note-books must be submitted for valuation at the University Examination.

Branch V—Botany Main

(Ancillaries)

(i) **Chemistry :** The syllabus same as for Group B—Chemistry under Br. I — Mathematics Main (Vide Syllabus No. 33).

(ii) **Zoology :** The Syllabus same as for Group B—Zoology under Br. IV — Chemistry Main. (Vide Syllabus No. 38).

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Geology

Introduction : The scope and sub-divisions of Geology.

General Geology :

The earth as a planet and its relation to the other members of the solar family.

The hypothesis of the origin of the earths.

The size and form of the earth, the interior of the earth ; the physical zones of the earth. The atmosphere, the hydrosphere and lithosphere.

Land and Sea : Distribution by surface extent ; heights and depths ; the continental shelf.

Planetary circulation : Rotational deflection ; sea breezes ; monsoons and rainfall.

Oceanic circulation : Causes and effects ; waves and tides. Geological Agents.

(*a*) Epigene agents ; atmosphere, oceans, rivers, glaciers and their work.

(*b*) *Hypogene agents :* Volcanoes, earthquakes, their causes and effects.

Age of the earth, Marine transgression and regressions. Raised beaches. River terraces and Origin of coral reefs.

Palaeontology : Introduction : Fossils, their mode of formation ; their value in Geological and Biological Sciences, tables of the divisions of Geological time.

1. Zoological characters and chief divisions of Protozoa — Fossils — Textularia, fusulina and nummulites.

2. Zoological characters of the Porifera. Canal system of the sponges — Ventriculites.

3. General characters of the Graptolites — monograptus, diplograptus.

4. General characters and divisions of the Coelenterata — corals — cyathophyllum, zaphrentis, calceola, thecosmilia, favosites, halysites, lithostrotion.

5. General characters of Echinodermata — echinoderms cidaris micraste, holaster, encrinus and pentremites.

6. General characters of Brachiopoda and brachiopod shell. Fossils — lingula, productus, pentamerus, spirifer, rhynconella and terebratula.

7. General characters of the Lamellibranchiata and lemallibranch shell — Fossils — acra, inoceramus, pecten, ostrea, gryphea, alectryonia, pectuncleus, hippurites, spondylus, unio, cardita and trigonia.

8. General characters of the Gasteropods and gasteropod shell — Fossils — Bellerophon, natica, turritella, cerithium, murex, fusus, conus, voluta and physa.

9. General characters of the Cephalopods, Nautiloidea and ammonoidea — Fossils — belemnites, nautilus, goniaitites, orthoceras, ceratites, scholenbachia :

10. General characters of the Trilobita — Fossils — Calymene, paradoxides, phacops, trinucleus.

11. Plant fossils — glossopteris, gangamopteris, ptilophyllum, calamites, and lepidodendron.

Structural and Field Geology and Stratigraphy : Order of superposition, conformable and uncomformable beds, overlaps, lithology and fossils correlation ; facies ; division of rocks into groups, system, etc., and geological time into era, epoch, etc.

Dip, strike, and outcrop ; variations in outcrops with reference to dip of bed and slope of valleys ; types of unconformity ; folds, synclines, anticlines, overfolds and fanstructure. Faults, normal and reverse faults, inliers and outliers.

A course of lectures to give a comprehensive general outline of Indian Stratigraphy.

Crystallography : Definition of a crystal, crystalline and amorphous external form, variation of form and surface, law of constancy of interfacial angles, symmetry — planes, axes and centre, axial ratio, parameters, indices, symbol, Weiss and Miller, law of rationality of indices, hemihedrism and hemimorphism.

The six normal classes, the pyritothedral class, the tetrahedral class, the tetragonal sphenoidal class, the rhombohedral class, the rhombohedral hemimorphic, the trigonal trapezohedral class and their forms.

Mineralogy : Physical — crystalline aggregates, columnar and fibrous structure, lamellar structure, granular structure, imitative shapes and pseudomorphs.

Cleavage, parting, percussion figures, fracture, hardness, tenacity, sp. gr. and its determination.

Isomorphous mixture, isomorphous replacement, diomorphism, sodimorphism and pseudomorphs.

Minerals : Quartz, and the more important varieties, feldspars, orthoclase, microcline, plagioclass, hypersthene, enstatite and augite, hornblende, actionolite and termolite — micas, tourmaline, topaz, flurite, natrolite, stilbite.

Olivine, garnet, nephelin, eleucite, sodalite, beryl, epidote, staurolita, kyanite, apatite, talc, chlorite, serpentine (asbestos), kaolin, bauxite, calcite, dolomite, siderite, magnesite, selenite, gypsum, baryte, celestite, anhydrite, corundam, diamond and graphite.

Ores : Magnetite, haematite, limonite, ochre, Ilmenite, chromite, pyrite, chalcopyrite, galena, sphalerite, pyrolusite, psilomelane, malachite, azurite, graphite, gold, silver, halite and zircon.

Petrology : Igneous rocks ; their distinguishing characters, intrusive modes of occurrence — dike, sheet, laccolith, neck, stock, batholith, and lava flows. Textures and structures of for megascopic study ; jointing in rocks.

Principles of classification, megascopic classification.

Description of rock types ; Granite, syenite, diorite, gabbron norite, Peridotite, pyroxenite, amphibolite, porphyry, dolerite, rhyolite, trachyte, andesite, and basalt.

Metamorphic Rocks : Metamorphic agencies and kinds of metamorphism. Texture in metamorphic rocks.

Rocks types : gneiss, slate, schist, phyllite, marble and serpentine.

Sedimentary Rocks : Classification into mechanically formed, chemically formed and organically formed rocks.

Mechanically formed : Soil, blown sand, grit, sand-stone, clays, boulde clay.

Chemically formed : Tufa, dolomite, rock salt, gypsum, flint and ironstones.

Organically formed : Limestones, carbonaceous rocks and coprolites.

Practical work will comprise of the following :

A study of the more important crystal models ; The fossil type mentioned — megascopic study of the minerals and rocks.

Exercises in plotting of outcrops on contour maps. Reading for maps relating to beds with thickness, unconformities, simple folds and an acquaintance with strike and dip faults.

Sketch maps of the following : Physiographical features of India, Dharwar rocks of South India, Cuddapah and Vindhyan system, Gondwana system, Createaceous of Peninsular India and Deccan trap.

Books Recommended for Study :

Text-book of Geology : Longwell, Knopf and Flint, John Wiley.

Geology : Principles and Processes—Emmons and others.

Introduction to Geology : Bailey, Weir and others, Macmillan & Co.

Palaeonotology : Woods.

Krishnan Er. M. S. : Introduction to the Geology of India, The Madras Law Journal Office, Madras.

Reference :

Fox C. S. : Physical Geography of India for Indian Students, Macmillan & Co.

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Physiology

Protoplasm : Cells and tissues of the body — cell division — Properties and functions of cell membrane ; cell permeability — diffusion, osmosis.

Atomic weights — Molecules — Equivalent weights — Oxidation and reduction — Acids, bases and salts — crystalloids and colloids.

Blood — Compositions and functions — Red Blood corpuscles — Haemoglobin — factors responsible for anamias.

Blood groups — blood transfusion

Loucocytes — origin, functions, fate

Blood platelets — clotting of blood — Blood forming organs — factors in blood formations.

Circulation of blood — Structure and working of the heart — Properties of cardiac muscle — Regulation of heart beat — Pulse — Velocity of blood — Blood pressure — Arteries, capillaries, veins.

Tissue fluid — formation, circulation, functions — lymphatic vessels and glands.

Urinary system — structure and functions of the kidney — acid — base balance in the body.

Skin — structure and functions — Regulation of body temperature —

Respiration — Respiratory mechanism — gaseous — exchange in the lungs and tissues — Regulations of respiration Transport of respiratory gases in the body.

Digestion — Essential food factors — structure of the different regions of the alimentary canal and the different digestic glands. Action of different enzymes on food taken in — Movements of the alimentary canal — Absorption and assimilation.

Nutrition — Food requirements of the body — Balanced diet — Composition of common foods in South India.

Endocrines — The functions of endocrines secretions with special reference to thyroid, pituitary and adrenals Nervous system — Parts of the nervous system and their functions treated in an elementary manner — Atomic Nervous system and its working — Reflex actions.

Structure and functions of the sense organs — the eye, the ear, organs of smell, taste and cutaneous sensations.

Neuro-muscular system — Physical and chemical changes during muscular contractions ; fatigue ; work done by muscles.

Reproduction — The ovary — development of the graafian follocle — Development of the sperm — Fertilization, segmentation, Development of the embryo ; the foetus ; parturition.

Practical

Tissues — Examination of prepared slides of the different tissues of the body — Fresh mounts of a few tissues —

Preparation of a blood smear and how to stain it.

Blood count — use of haemocytometer to make a count of R.B.C. and W.B.C.

Estimation of haemoglobin with the haemometer.

Blood pressure determination.

Effect of stannuis ligature.

Recording the effect of temperature on heart beat ; stimulation of the vago sympathetic Histological study of the various organs studied in theory —

Salivary digestion —

Study of spinal frog — reflex action —
Human reflexes.

Recording pulse and temperature — Exercises demonstrating the effect of exercises on temperature and pulse.

Experiments with the muscle-nerve. Preparations from a frog-Recording.

1. A simple muscle twitch.
2. The effect of fatigue.
3. The effect of temperature.
4. The effect of " loading " and " after loading ".

Branch VI—Zoology Main

(Ancillaries)

(i) **Chemistry**	:	The Syllabus same as for Group B—Chemistry under Br. I—Mathematics Main. (Vide Syllabus No. 33).
(ii) **Botany**	:	The Syllabus same as for Group B—Botany under Br, IV—Chemistry Main. (Vide Syllabus No. 37).
(iii) **Geology**	:	The Syllabus same as for Group B—Geology under Br, V—Botany Main. (Vide Syllabus No. 39).
(iv) **Physiology**	:	The Syllabus same as for Group B—Physiology under Br. V—Botany Main. (Vide Syllabus No. 40).

Branch VII—Geology Main

(Ancillaries)

(i) **Chemistry** : The Syllabus same as for Group B—Chemistry under Br. I—Mathematics Main.
(Vide Syllabus No. 33).

(ii) **Physics** : The Syllabus same as for Group B—Physics under Br. I—Mathematics Main.
(Vide Syllabus No. 32).

(iii) **Zoology** : The Syllabus same as for Group B—Zoology under Br. IV—Chemistry Main.
(Vide Syllabus No. 38).

(iv) **Mathematics** : The Syllabus same as for Group B—Mathematics under Br. III—Physics Main.
(Vide Syllabus No. 36).

CHAPTER XLIII

DEGREE OF BACHELOR OF SCIENCE IN HOME SCIENCE

(B.Sc. Home Science)

(Three year Degree Examination)

REGULATIONS

Conditions for Admission

1. Candidates for the degree of Bachelor of Science (Home Science), shall be required to have passed the Pre-University examination of this university or an examination accepted by the Syndicate as equivalent thereto and to have subsequently undergone a prescribed course of study in an affiliated college of this University for a period of not less than three academic years or nine terms.

Course of Study

2. The course of study shall comprise the following subjects according to syllabus to be prescribed from time to time.

The course of studies in Parts I and II shall be the same as prescribed foı B.A. and B.Sc. degree courses.

Part I—Language

(Syllabus is common for B.A. and B.Sc. courses)

The course shall comprise the study of any one of the following classical or Modern (Indian or Foreign) Languages at the option of the candidate according to the syllabus and text-books prescribed from time to time. In the case of candidates whose mother tongue is not Tamil, a separate syllabus in Tamil is prescribed.

Classical : Sanskrit and Arabic

Modern : (i) Indian : Tamil, Malayalam, Urdu and Hindi

(ii) Foreign : French.

The studies of detailed texts to be prescribed shall extend over a period of two years and the candidates shall be examined at the end of the first year and the second year in the detailed texts prescribed therefor.

In the case of candidates whose mother tongue is not Tamil, a separate syllabus is prescribed for them.

Part II—English

(Syllabus is common for B.A./B.Sc. Degree Courses)

The course should aim both at the further development of the language skills acquired by students in the Pre-University class and at the introduction of students to English literature through the study of a few of the finest compositions in prose, poetry and drama in English literature.

These two aims of the study of literature and language can really never be completely separated except in a technical study of language. For, in the last analysis, good literary composition in writing that conveys meaning or significance most effectively. Hence, in the B.A./B.Sc. and B.Sc. (Home Science) syllabus the two aims are to be held and pursued together, as far as possible in every part of the syllabus.

Syllabus :

The course will comprise the following :

(*a*) Language study (first year).

(*b*) Study of 20th Century Prose (First year)

(*c*) Introduction to the classics—poetry, drama, and pre-twentieth century prose (both years)

(*d*) Extensive reading (both years)

Part III Major

1. Physiology, Microbiology including Parasitology.
   Theory
   Practical

2. Foods and Nutrition
   Theory
   Practical

3. Home Management
   Theory
   Practical

4. Textiles and Clothing

5. Child Development.

6. Elective : Any one of the following :
   (i) Sociology
   or
   (ii) Home Science Extension Method

Ancillary subjects

1. Ancillary—I Chemistry*
   Paper I
   Paper II
   Practical

2. Ancillary—II Physics*
   Paper I
   Paper II
   Practical

* The Syllabus is common as prescribed in B.Sc. (General) degree course.

3. The scheme of Examination shall be as follows :

Scheme of Examination There shall be three papers each of three hours duration carrying a maximum of 100 marks.

Part I—Tamil

(Common for B.A. & B.Sc. Part I.)

		Hours	Marks
At the end of the first year			
Paper I—Prose and Drama	...	3	100
At the end of the second year			
Paper II—Poetry and Grammar	...	3	100
Paper III—Comprehension, composition, History of literature and Translation	...	3	100

For the Candidates whose mother tongue is not Tamil.

Part—I

		Hours	Marks
At the end of the first year			
One Paper	...	3	100
At the end of the second year			
One Paper	...	3	100

(For scheme of examination in other languages refer regulations of B.A., B.Sc., courses.)

Part II—English

Common for B.A. & B.Sc. Part II-English

There shall be four papers each of three hours duration carrying a maximum of 100 marks.

		Hours	Marks
At the end of the first year			
Paper I—Twentieth century prose Grammar and composition	...	3	100
Paper II—Poetry and Drama I	..	3	100
At the end of the second year			
Paper III—Twentieth century prose and composition	..	3	100
Paper IV—Poetry and Drama II	..	3	100

Part III

The Scheme of examination shall be as follows :

At the end of the first year

Physiology, Microbiology including Parasitology :

Theory	..	3	60
Practical	..	3	40

At the end of the second year

Ancillary I—*Chemistry :

Paper I	..	3	60
Paper II	..	2	40
Practical	..	3	50

At the end of the third year		Hours	Marks
Ancillary II—*Physics :			
Paper I	..	3	50
Paper II	..	3	50
Practical	..	3	50
Major :			
Foods and Nutritions :			
Theory	..	3	80
Practical	..	3	40
Internal assessment	..		10
Home Management :			
Theory	..	3	80
Practical	..	3	40
Internal assessment	..		10
Textile and Clothing :			
Theory	..	3	60
Internal assessment	..		20
Child Development :			
Theory	..	3	60
Internal assessment	..		20
Sociology :			
Theory	..	3	60
Internal assessment	..		20

Each candidate shall submit her practical record books containing the record of all practical work performed during the period of study. The records shall be countersigned by the Professor under whom the candidate worked to certify them to be bona fide records of work performed by the candidate. The record books shall be submitted by 31st January of the year of appearance to the examiners conducting the examination, and the allotment of marks in the practical record books shall rest with examiner.

4. No candidate shall be declared eligible for the Degree of Bachelor of Home Science unless she has completed the course of study prescribed and passed the examinations in the several subjects contained in the course of study as detailed in the regulations aforesaid.

Conditions of Eligibility of a Candidate for the Degree

5. A candidate shall not be declared eligible for the Degree of Bachelor of Home Science unless she has passed the examination in the selected language under Part I, in English under Part II and in the subject under Part III.

Part I—Tamil

6. Those who have obtained 35% of marks in that paper or 35% of marks taken together in the papers in that year are considered to have passed in that subject or in that year.

Minimum Marks for a pass

For purpose of classification, the total number of marks obtained in all the papers under Part I in the aggregate will be taken into consideration.

Part II—English

Those who have obtained 35% of marks in both the papers taken together at the end of the first year are considered to have passed in that year.

Those who have obtained 35% of marks in both the papers taken together at the end of the second year are considered to have passed in that year.

For purpose of classification, the total number of marks obtained in all the four papers under Part II in the aggregate will be taken into consideration.

Part III

Those who have obtained 35% of marks in the paper or in the papers taken together in the aggregate in that year are considered to have passed in that paper or in that year.

For purpose of classification, the total number of marks obtained in all the papers in the aggregate under each part respectively viz. Part I, Part II and Part III will be taken into consideration.

Classification of Successful Candidates

7. Candidates who obtain 60 per cent or above of the total marks in Part III shall be placed in the first class. Successful candidates who obtain less than 60 per cent but not less than 50 per cent of the marks in Part III shall be placed in the Second class. All other successful candidates in Part III shall be placed in the third class. A candidate securing not less than 75 per cent of the marks in Part III of the examination shall be declared to have passed in that Part with distinction.

8. Mark Statements shall be furnished to the Candidates.

B.Sc.

Home Science

(Syllabus)

Physiology

Theory : 2 hours per week

Objectives : A systematic study of Physiology

1. **Cells** : Tissues and their organisation to organs and systems.

2. Blood : Its composition ; Blood cells, their development, and functions ; process of clotting of blood, blood grouping and transfusion ; Blood volume.

3. Lymph : Its function, composition and functions.

4. The Heart and circulation : Structure of the heart and blood vessels ; the cardiac cycle ; Heart Rate ; Blood pressure ; pulse, capillary circulation.

5. Respiration : Structure of the Respiratory system : Mechanism of respiration ; exchange of gases in the lungs and tissues ; regulation of respiration ; transport of gases ; hypixia ; asphyxia, and artificial respiration.

6. The Digestive System : Gross features of the structure : Secretion of digestive juices and their actions ; Movements of the Digestive tract ; Absorption of food ; Liver and its functions.

7. Urinary System : Kidneys and their functions—Urine formation and composition of urine ; micturition.

8. Skin : Its structures and functions ; Regulation of body temperature.

9. Endocrinology : General principles of endocrine secretions and their actions ; structure of all endocrine glands and their hormones. Fairly detailed study of reproductive functions in the female and the male with a knowledge of the endocrine mechanisms that regulate them.

Female Reproductive Physiology :—in detail with the application of this study to problems of Family Planning.

To include :

(i) Human menstrual cycle.

(ii) Physiology of pregnancy and parturition.

(iii) The mechanism of lactation.

10. The Nervous system : Parts of the Central Nervous system and the autonomic nervous system. The spinal cord and reflex actions ; the cerebral cortex and its functions ; the cerebellum and its functions, the autonomic nervous system.

11. Physiology of Special Senses : Vision, hearing, taste and smell.

Practical

Experimental Physiology : Demonstration of experiments on muscle and nerve and the heart—demonstration of sheep's heart also.

The student should carry out the following exercises on Human Physiology :

1. Identification cells in a stained blood smear.
2. The red blood cells count and haemoglobin estimation.
3. White blood cell count.
4. Recording of arterial blood pressure.
5. Blood grouping : clotting time ; bleeding time.

Histology :

1. Epithelial cells, muscle, cartilage, bone.

2. The Ailmentary Tract which should include therefore, the stomach, intestines, liver and pancreas.

3. The Lung.

4. The Kidney.

5. Endocrine glands—slides, on pituitary, thyroid, and parathyroid, adrenals, and islets of Langherhans, ovary and testis.

6. Nervous system : Cerebrum, cerebellum, spinal cord.

7. Skin.

Books Recommended—Physiology

** Only Editions published after 1960, preferably the latest.

Sl. No.	Author	Title	Publishers	Edition
1.	Charles Best and Edmund Burke	The Living Body	Asia Publishing House	Latest **
2.	Green, J.H.	Introduction to Human Physiology	Oxford University Press	Latest **
3.	Catherine, Parker, Antony	Text Book of Anatomy and Physiology	C. V. Mosby Company, U.S.A.	Latest **
4.	Kimber Gray, Stackpole	Anatomy and Physiology	Macmillan Company, New York	Latest **
5.	Trence A. Rogers	Elementary Human Physiology— A Text book for Undergraduate	John Wiley and Company	Latest **
6.	Carlson, Johnson, Cavert	The Machinery of the Human body	The University of Chicago Press, Illinois	Latest **

SYLLABUS

Microbiology including Parasitology

Objectives :

1. To instruct students who are having their first experience with microbiology, on the nature of micro-organisms, their variety, and the methods of their study.

2. To outline the scope and survey the major areas in the field of microbiology ; to acquaint students with the common pathogenic organisms ; how they are transmitted to man and how they may be prevented from causing disease in man.

3. To provide a preliminary course of microbiology sufficient to lead to a higher course such as M.Sc. (Microbiology) for non medical graduates, or entry to courses in medicine, public health education, nursing etc.

THEORY

(2 hours a week)

1. General scope of microbiology—Its importance in Medicine, Public Health, Agriculture and Industry.

2. General characteristics of main groups of Micro-organisms-Bacteria, Viruses, Rickettsia, Fungi and Protozoa.

3. Distribution of micro-organisms in, and human infections transmitted through air, water, soil, sewage food (milk and milk products, fruits and vegetables, meat, fish and eggs).

4. Micro-organisms in fermentation, food spoilage, food preservation. Need for food preservation. Method of food preservation : Heat, Cold, Drying, preservatives.

5. Bacterial Food poisoning and food borne infections Ypes, causes, specimens for microbiological examination, epidemiology and prophylaxis

6. An elementary knowledge of :

   (a) Common human diseases caused by micro-organisms and helminths, disease transmission and prevention methods.

   (b) Diseases transmitted from animals to man.

7. Sterlisation methods :

(a) Physical methods :

(1) Heat (autoclave, Pasteurisation)

(2) Radiation

(3) Filteration—filts (Berkefeld).

(b) Chemical methods :
" Disinfectants and antiseptics."

Disinfection of rooms, bed, clothes and other articles of patient use.

Sterlisation of dry goods, surgical dressings, instruments, syringes.

8. Anti-microbial drugs commonly used : sulphonamides and antibiotics.

9. Body defence mechanisms against infection.

Types of immunity ; hyper sensitivity (allergy and anaphylaxis) ; Immunity in bacterial and virus diseases.

10. Prophylactic immunisation in the control of communicable diseases-small-pox, poliomyelitis, tuberculosis, typhoid, cholera, diphtheria, whooping cough and tetanus.

Practicals :

(2 hours per week)

1. Study of the Compound Microscope and methods of use.

2. Microscopic examination of bacteria by ' Hanging Drop ' preparation, and coverslip wet preparation.

3. Methods of making film or smear preparation and staining of films by:

(a) Negative staining.

(b) Simple staining—Aqueous Methylene blue, Dilute Carbol fushion.

4. Demonstration of selective or differential staining—

(a) Gram's Stain

(b) Ziehl Neelsen Stain.

5. Demonstration of bacterial structures

(a) Spores

(b) Capsule

(c) Flagella

(d) Metachromatic granules.

6. Demonstration pathogenic micro-organisms—Stained preparations of

(a) Staphylococcus, Streptococcus, Pneumococcus, Typhoid bacillus, Cholera vibrio, Tubercle bacillus, Leprosy bacillus, Anthrax bacillus, Tetanus bacilli, Plague bacillus.

(b) Spirochaetes

(c) Inclusion bodies of virus (Negri bodies)

(d) Fungi (Moulds, Yeasts).

7. Demonstration of protozoal prarasites :

(a) Amoeba-Vegetative form and cystic form

(b) Malarial parasites

(c) Trypanosomes

(d) Leisnman-Donovan Bodies

(e) Balantidium Coli.

8. Demonstration of Helminths infecting man.

(a) Common Round Worm — adults and eggs

(b) Hook-worms — adults and eggs

(c) Guinea-Worm

(d) Filarial worms and Microfilariae

(e) Tapeworms — adults and eggs

(f) Flukes.

9. Demonstration of common culture media used in microbiology.

10. Bacteriological examination of air, water, milk.

11. Excursions to milk factory, sewage farm, water-works and microbiological institutes. Like King Institute (Madras) & Pasteur Institute (Coonoor) desirable.

Books :

1. " Microbiology " — MJ. Pelczar & R. D. Reid, (latest edition year 1965) McGraw-Hill Book Co.

2. " Bacteriology "—C. G. A. Thomas, 1964, Bailliere Tindall & Cox Lond.

3. Bigger's " Handbook of Bacteriology "—Edited by F. S. Stewart. 1962 Bailliere Tindall and Cox.

4. " A Text-book of Bacteriology "—by R. W. Fair Brother 1960, W. M. Heinemann medical books Ltd.

References :

5. " Laboratory manual for bacteriology and immunology "—by B. S. Mallick British Book Depot, Lucknow, year 1967.

6. " Medical microbiology "—by R. Cruickshank, 1965, Livingstone.

7. " Zinsser's " Microbiology "—13th Ed. Appleton—Century Crofts N.Y.

8. " Food Poisoning "—by W.C. Cockburn and others, 1962 Lond. Royal Soc. of health.

9. " Food—microbiology—by W.C. Frazier, 1968, McGraw Hill.

10. " Air-Borne infection—Transmission and control "—by R. L. Riley and F. Grady, 1962, Macmillan.

11. "Lecture notes on the use of the Microscope "—by R. Barer, 1962, Blackwell.

12. " Natural history of infectious disease "— by F. M. Burnet, 1962, Academic Press.

FOODS AND NUTRITION

Objectives : To enable students

1. Understand the role of nutrition in maintaining good health.
2. Obtain knowledge of different food groups and their nutritive value.
3. Study the different methods of cooking and their merits and demerits.
4. Gain experience in the preparation of foods with attention to the preservation of their nutritive values, using cooking methods generally employed in Indian homes.

2 Consecutive hours/1 week

Theory	*Practical*	*Related experiences*
1. The relation of good nutrition to normal physical development and sound health. Methods of assessing nutritional status.	1. A study by each student of her own status of health and evaluation in relation the 'signs of good nutrition'. Body measurements in relation to good nutrition.	Visit to institutions and taking heights and weights of children.
2. Food groups which will provide nutritive requirements for normal health ; body building foods, energy foods, protective foods,	2. Grouping different foods in the laboratory and comparing their nutritive value,	Visit to markets to observe the basic food groups on sale,

Theory	*Practical*	*Related experiences*
3. A study of cooking methods, and how they may be used properly to preserve the nutrients in foods—advantages and disadvantages of different cooking methods, boiling, steaming, stewing, frying, broiling, parching, bafling, cooking under pressure and use of microwaves for cooking.	3. (*a*) Introduction to the use of kitchen and dining equipment. Sanitary requirements for washing dishes and utensils. Care and cleaning of equipment.	
	(*b*) Experimental study of the effects of different methods of preparation and cooking on the preservation of nutritive value, appearance and palatability of foods (i) fine, broken and whole cereals (ii) pulses (iii) vegetables and fruits (iv) milk and milk products (v) eggs and flesh foods (vi) fruits.	
	(*c*) Experiences in preparing fleshings involving taking pressure cooking and other methods,	

Theory	*Practical*	*Related experiences*
4. The source of manufacture, food composition, and nutritive value of common foods :		
(*a*) Cereals : Structure of cereal grains. Their nutritive value—Results of milling and washing of cereals. Effects of different cooking methods. Factors affecting their palatability. Parboiling and its advantages. Enrichment of cereals.	4. (*a*) Examination of rice starch. Preparation of rice by the steam and pressure cooker methods, hay box and other absorption methods, excess water methods, utilization of strained water, preparation of other cereal products.	
(*b*) Pulses : Their nutritive value—importance in vegetarian diets as sources of protein—Improvement of the protein of pulses. Values of germinating pulses.	(*b*) (i) Preparation of pulses—sambar, thick dhal, groundnut sundal. Sprouting of grams and use of sprouted grams. (ii) Preparation rich in protein and calories (cereals and pulse combination).	
(*c*) Fruits : Their nutritive value—Importance in the diet.	(*c*) Preparations with fruits : fruit salads, fruit punch.	

Theory	*Practical*	*Related experience*
(*d*) Vegetables : Classification according to structure and pigments and nutritive value. Factors affecting structure, palatability and appearance of cooked vegetables.	(*d*) Vegetables — selection — cleaning, cooking and serving—curries, pugath, pachadi and salads.	
(*e*) Flesh foods : Quality of meat, poultry, and fish. Food value—importance sources of proteins. Methods of cooking.	(*e*) Preparation of dishes with meat and fish—mutton curry, chicken biriyani, fried fish.	
(*f*) Eggs : Structure and nutritive value. Qualities of egg protein. Use in the diet. Digestibility of eggs.	(*f*) Preparation with eggs—Poached eggs, custards, omelettes, egg curry.	
(*g*) Milk and milk products : Nutritive value of milk and digestibility. Different types of milk and milk products. Pasteurisation of milk, and its effect on the nutritive value.	(*g*) Preparation with milk—ice—cream, pudding, payasam, milk shake Curds, butter milk, morkozkambu, Thayir Vadai.	
(*h*) Nuts : Their nutritive value and importance.		

Theory	Practical	Related experiences
(i) Beverages: Their role in the daily diets.	Beverages : Coffee, tea, cocoa, Rose-milk, panagam, ginger drink, Fruit juices, butter-milk.	
(j) Spices and Condiments : Their uses and abuses.		
5. Sanitary requirements in the procurement and use of water and foodstuffs in the home. Personal hygiene Food and water borne diseases.		
6. The basic food requirements of children, adolescent, adults and other members of the family.	6. Demonstration of food portions to yield a portion of the adult woman's daily allowance. e. g. : Food portions yielding 400 calories (1/5th of the daily allowance) food portions yielding 9 gms. of protein (1/5th of the daily allowance) etc.	
7. The effect of food preparation and service on developing healthy food habits, Factors involved in building good appetite.		

Theory	*Practical*	***Related experiences***
8. A study of the problems involved in the improvement of nutritional practices in a community.	Maintaining a record of a family's diet for 3 days. Visit to a nearby village, where some nutrition extension work has been done to see the progress.	Conducting Diet Survey in a selected community.

Consecutive **2 hours/week**

Objectives : To provide information on :

(1) Different nutrients

(2) The use of animals in the study of nutrition.

(3) The contribution of nutritionists.

1. Energy : Definition of Caloric history of determination of energy requirements. Energy needs of the body—basal metabolism, factors affecting basal metabolism. Calculation of basal Metabolic rate and total energy needs of the body. Calculations of energy requirements in terms of total calories and the proportion of proteins, carbohydrates and fats to supply them. Specific Dynamic Action of food stuffs.	1. Demonstration of—determination of the Basal Metabolic Rate.	

Theory	Practical	Related experiences
2. Carbohydrates : Classification, digestion, absorption, metabolism, functions, sources and requirements.	2. Chemical tests (*a*) Qualitative tests for Carbohydrates (*b*) Quantitative estimation of sugar glucose.	
3. Proteins : Classification (chemical and biological) Digestion, absorption and metabolism, Functions, sources and requirements at all age levels and conditions. The supplementary value of different proteins. Biological value of proteins, essential amino acids measurement of biological value. Deficiency status due to shortage of protein.	3. (*a*) Qualitative tests for proteins. (*b*) Quantitative estimation of total nitrogen in foods.	
4. Fats : Classification, Digestion, absorption, metabolism, Poly unsaturated fatty acids versus saturated fatty acids. Functions, sources and requirements. Essential fatty acids and their requirements —Effects of deficiency.	4. Determination of fats in foods and iodine value.	
5. Calcium, Phosphorous and Iron, importance, functions, absorption, metabolism, factors affecting the utilization, requirements, sources and effects of deficiencies.	5. (*a*) Qualitative tests for minerals. (*b*) Quantitative estimation and phosphorus.	

Theory	*Practical*	*Related experiences*
Importance of trace elements in human nutrition. Coppers cobalt, Iodine, Sodium, Potassium, Manganese, Iodine and Fluorine.	(*c*) Demonstration experiment on quantitative estimation of iron.	
6. Study of vitamins in human nutrition—history, chemistry, measurements, absorption, metabolism, functions (biochemical), Requirements, sources effects of deficiencies.	6. (*a*) Quantitative estimation of vitamin C. (*b*) Qualitative tests for vitamin A.	
Fat soluble vitamins—vitamin A, vitamin D, vitamin E and vitamin K and water-soluble vitamins—ascorbic acid thiamine, riboflavin, niacin and other B complex vitamins.	(*e*) Demonstration experiment of quantitative estimation of cartene and thiamine.	
7. Interrelations of carbohydrates, fats, proteins, vitamins and minerals.		
8. Animals in nutrition experiments.	8. Demonstration of rat growth study.	

3 hours/week theory : **2 hours/week practical**

Objectives : To help students gain knowledge of the :

(1) Various nutritional disorders and diseases.

(2) Nutritional needs of members at different age levels and stress conditions.

Theory	*Practical*	***Related experiences***
	(3) Planning and preparation of meals for the family to meet special dietary needs.	
	(4) Calculation of the values of the dietaries which are planned, prepared and served.	
	(5) Observation of activities (rural and urban) designed to improve nutrition practices.	
1. Building up of normal diets—prescription of a dietary card principles of menu planning and planning meals for different income levels.	1. Review of the sanitary practices to be observed in the laboratory and kitchen. 2. Planning preparation and service of food for different individuals and families, Calculation of food. Planning a meal for a group—Market list, organisation of work determination of cost. Demonstration of food service (*a*) Indian style and (*b*) Western style. Preparation of low and medium cost meals for a family to emphasize proper cooking and utilization of supplementary foods,	

Theory	*Practical*	*Related experiences*
2. The nutritional requirements to meet the special needs of the vulnerable groups.	2. Preparation low and medium cost meals planned to meet extra needs of (1) expectant mother (2) nursing mother (3) pre-school child and (4) adolescent. Wish to school lunch programmes.	
(*a*) Pregnant and lactating mothers.		
(*b*) Infants — Breast milk versus artificial feeding ; Types of milk and their use in infant feeding, Building of formulae, Problems in eating, foods supplement for the different stages.		
(*c*) Pre-school children — Special care needed in planning their meals.		
(*d*) Children of 6—12 years : A study of factors involved in developing good food habits in young children School lunch programmes.		
(*e*) Adolescence Factors to be considered in planning diets for young boys and girls.		

Theory	*Practical*	*Related experiences*
3. Nutritional requirements of adults and old people. Care needed in planning diets for the old people.	3. Preparation of low and medium cost meals for adults and old people.	
4. Modification of the normal diets to help in the prevention of dietary deficiency diseases. Special diets required in the treatment of the Leprosy diseases which are most common in India.	4. Preparation of diets for the following deficiency states : (1) Protein deficiency (2) Vitamin A deficiency (3) Iron deficiency.	
5. Diets for the following diseases : (*a*) Disorders of the digestive tract. (*b*) Diseases of the liver and biliary tract. (*c*) Febrile conditions—fevers of short duration and long duration and—Influenza, typhoid and tuberculosis. (*d*) Obesity and leanness. (*e*) Diabetes mellitus,	5. Preparation of diets for the following conditions : (1) Digestive disturbances. (2) Obesity and diabetes, mellitus—use of exchange lists. (3) Heart diseases. (4) Urinary diseases.	Visit to hospital dietectics department.

Theory	Practical	Related experiences
(*f*) Diseases of the heart and circulatory systems.		
(*g*) Diseases of the urinary tract.		
(*h*) Allergy.		
6. The use of supplementary foods such as protein concentrates—groundnut and other oil seeds meals, fish meals, leaf proteins, powdered milk and multipurpose foods in the improvement of diets and their value in daily meals.	6. A three day dietary study by each student to determine if foods from each basic group are included in her daily meals.	Visit to CFTRI and the local MPF factory.
7. Food preservation by scientific methods : (*a*) refregeration, freezing. (*b*) water bath and pressure canning. (c) preservation with sugar and spices. (*d*) dehydration. (*e*) Salting and pickling. (*f*) chemicals used in food processing—ionizing radiations.	7. Practical experience and or observation on each of these methods.	Visit CFTRI

Theory	*Practical*	*Related experiences*
8. Food storage.	8. Study of the storage practices adopted in the comments for cereals, pulses and vegetables.	Visit to Goverment Godowns for storage of food.
9. Food adulteration practices and methods of control—a review of pure food laws	9. Examination of the commonly adulterated foods.	Arrange talk by the local health authority.
10. A study of schemes being executed in India for the improvement of nutrition practices—Five Year Plans, National Extension service, Applied Nutrition Programme and its importance, School Lunch Programmes, Maternity and Child Welfare Centres, Bharat Sevak Samaj, ICMR, CSWB.	10. Field trips to : (*a*) Home Science wings —work of a gram sevika. (*b*) Applied Nutrition Programme. (*c*) Maternity and Child Welfare Centres. (*d*) School lunch centre Panchayat garden.	
11. Efforts to increase food production.	11. Visit to Agricultural exhibits.	
12. A review of international schemes for the improvement of nutrition practices, —UNESCO, UNICEF, WHO, FAO, CARE, FORD FOUNDATION,	12. Arrange film shows on the work of these international agencies,	

List of Reference Books

Sl. No.	*Author*	*Title*	*Publisher*	*Year*
1.	E. W. McHenry	Basic Nutrition	B.B. Lippincott Co., Philadelphia and Montreal.	1957
2.	Clara Mac Taylor, Gracy MacLeod and Mary Schwarty Rose	Foundations of Nutrition (5th ed.)	The Macmillan Co., New York	1958
3.	Published for H.J. Heinz Co.	The Heinz Handbook of Nutrition	The Blakiston Division, McGraw Hill Book Co., Inc. London, New York, Toronto.	1959
4.	Henry C. Sherman	Chemistry of Food and Nutrition (8th ed.)	The Macmillan Co., New York	1960
5.	L. Jean Bogert	Nutrition and Physical Fitness (7th ed.)	W. B. Saunders Co., Philadelphia & London	1960
6.	Margaret S. Chaney	Nutrition (6th ed.)	Houghton Mifflin Co., Cambridge, Mass, U.S.A.	1960
7.	V. N. Patwardhan	Nutrition in India (2nd ed.)	The Indian Journal of Medical Sciences, Bombay-400 004.	1961

Sl. No.	*Author*	*Title*	*Publisher*	*Year*
8.	Eva D. Wilson Katherine, H. Fisher, Mary E. Fuqua	Principles of Nutrition	John Wiley & Sons, Inc., New York	1965
9.	Cooper, Barber Mitchella, Rynberger and Greene	Nutrition in Health and Disease (15th ed.)	J. P. Lippincolt & Co., Philadelphia, Montreal.	1967
10.	Marie V. Krause	Food Nutrition & Diet Theraphy (3rd ed.)	W. B. Saunders Co., Philadelphia & London	1964
11.	Fairfax T. Proudfit Revised by Corinne H. Robinson	Normal and Therapeutic Nutrition (12th ed. (first Indian ed.).	Oxford & IBH Publishing Co., Calcutta-760016.	1965
12.	The Home Science Association of India	Indian Journal of Home Sciences	Sri Avinashilingam Home Science College, Coimbatore	Half Yearly
		The Journal of Nutrition and Dietics	—do—	Quarterly

HOME MANAGEMENT

2 Consequent period/1 week.

Elements of Managements :

Objectives :
1. To help students understand the meaning of management.
2. To increase ability to solve personal management problem.
3. To recognise the importance of wide use of resources to achieve one's goals.

Theory	*Practical*
1. Introduction to Home Science : What is Home Science ? History of Home Science in India. Home Science Association of India. Introduction to Home Management : (*a*) Meaning of home management. (*b*) Relation of home management to other areas of Home Science. (*c*) Characteristics of a good manager.	

Theory	*Practical*
2. Elements involved in management :	
(*a*) Process--Planning, Controlling and Evaluating.	
(*b*) Decision making	
Habitual Vsconscious decision making.	
Individual and group decision.	
Steps involved in decision making.	
Factors aiding in good decisions.	
(*c*) Goals and Values—their relation to decision making.	
3. Resources :	
(*a*) Human and non-human resources.	
(*b*) How utilised to achieve family goals.	
4. Time and Energy Management :	
(*a*) An elementary knowledge of time and energy as resources.	
(*b*) Management process applied to the use of time and Energy.	

Theory	Practical
14 5. Improving One's method of work by :	
(*a*) Change in work place.	
(*b*) Change in method of work (sequence).	
(*c*) Change in body posture.	
(*d*) Change in tools.	
289 Applied Art and Interior Design :	
1. Place of Art in everyday life. Good taste and the consumer.	Analyse a number of objects as 'good' and 'bad' design. Include illustration from everyday life, e.g. furniture.
2. Principles of design :	Quote at least one design using any media, e.g.
(*a*) Elements of Design.	(*a*) decoration design for a runner a wall hanging.
(*b*) Types of design. Characteristics of good design.	

Theory	Practical
3. Principles of design :	Experiments with clay or wire to create forms and shapes.
(*a*) Harmony : Meaning Types Means of getting (i) Repetition (ii) Contrast (iii) Transition	Practical application of harmony to : 1. Draping curtains 2. Arranging furniture 3. Colour schemes in dressing and interior designs 4. Table setting
(*b*) Proportion : Meaning Means of obtaining good proportion.	1. Select suitable illustrations to show good proportion in architecture, interiors and other objects. 2. Illustrating good proportion in : (*a*) Flower arrangement (*b*) Designing a greeting card (*c*) Grouping objects.
(*c*) Balance : Meaning Types Means of getting each	Illustrating each type of balance in : 1. Interior design 2. Flower arrangement 3. Dress design 4. Architecture

Theory	Practical
(*d*) Emphasis : Meaning Means of getting	1. Exhibit an article or groups of objects using different methods of emphasis. 2. Prepare a poster (for a college exhibition or class use). 3. Evaluate the effectiveness of the exhibit and the poster. 4. Create centre of interest in interior design.
(*e*) Rhythm : Meaning Means of getting	Experiment with different ways of obtaining rhythm in : 1. Display of articles 2. Interior design Select Articles showing good rhythm—fabrics, costumes design, ornamental ware.
4. Colour :	
(*a*) Qualities of colour : Hue Value Intensity Colours and the emotions	1. Prepare a colour wheel or chart using pigments—Include values and intensities. 2. Use simple experiments to study the effect of coloured lights on : (*a*) Coloured materials use in the interior (*b*) Dress.
Advancing and receding colours. Effects of colours upon each other. Effect of coloured lights upon coloured materials.	

Theory

(*b*) How to use colour :

(*a*) Balance in Colour :

Balancing bright and dull colour.

Balancing dark and light colour.

Balancing warn and cool colour.

(*b*) Proportion in colour law of areas.

(*c*) Harmony in colour.

5. Using knowledge of design and colour to interioı design :

(*a*) Selection and arrangement and care of furniture.

Living

Dining

Study

Bed Room.

(*b*) Selection and use and care of furnishing materials :

Draperies and curtains.

Floor coverings.

Practical

1. Illustrate in dress.
2. Illustrate in interior design.
3. Illustrate in flower arrangement.

Experiments with possible methods of obtaining the following effects :

(*a*) an illusion of space.

(*b*) a feeling of warmth and informality.

(*c*) a cool and restful atmosphere.

Theory	*Practical*
(*c*) Selection and use and care of accessories Pictures and wall hangings	Accessories in Traditional, Modern and rural India.
Flower arrangement Other art objects.	Arranging Havers in different types of curtains, hanging pictures.
(*d*) Landscape gardening.	Visits to selected garden plot.

HOUSING

Objectives : To help students understand :

1. The values and goals in housing.
2. The elementary principles of planning and constructing houses. ;
3. The principles of maintenance that promote health and comfort of the family.

1. Functions of the house and its site :

(*a*) Importance of values and goals in housing.	1. Analyse the activities of a family.
(*b*) Kinds of activities carried on by the family and the conditions that are favourable to carrying on these activities satisfactorily.	2. Group related activities. 3. Allocate space in the house for these activities.

Theory

(*c*) Changes in the activities and corresponding demands as the family grows up.

(*d*) The minimum housing needs. Values to be considered in deciding the relative importance of other desirable housing features.

2. Housing and neighbourhood standards :

(*a*) Zoning
(*b*) Building codes
(*c*) Town planning
(*d*) Minimum standards for housing.

3. Features of a dwelling contributing to livability. Orientation, grouping, roominess, lighting and ventilation, circulation, storage facilities, privacy, flexibility, strength and stability, sanitation and safety.

4. Developing house plans :

(*a*) Low income, middle income and high income groups.

Practical

1. Learning to read a house plan.
2. Compare house plans of different income groups.

Theory	Practical
(*b*) Learning to evaluate a house plan.	3. Drawing house plans (floor plans).
	4. Indicating furniture arrangement in different rooms by means of paper cut outs or other means.
5. Building materials used for the construction of house :	1. Visit to exhibitions of building materials.
floors, walls, roof, windows and doors, electrical fittings and fishing hardware.	2. Collect tiends in building materials from advertisements.
	3. Evaluate the building materials used in floors, walls, windows and doors—with reference cost, convenience, durability and beauty.
6. Lighting in the house—Natural and Artificial :	
(*a*) Importance	
(*b*) Principles of house lighting—lighting needs for different activities.	
(*c*) Types of lighting.	
(*d*) Selection of lamp shades.	
(*e*) Adequate and safe wiring.	

Theory	*Practical*
7. Water supply and sanitation :	Use and care of different sources of water.
(*a*) Water supply :	
(i) Community water supply — sources.	
(ii) Domestic water supply — wells, storage and purification.	
(*b*) Sanitation :	
(i) Safe disposal of sewage and other waste.	
(ii) Study of different types of latrines.	
8. Care and maintenance of the house and its surroundings :	1. Experience in caring for skins, drains, water closets and other surfaces in the houses.
(*a*) Daily, weekly and periodical care to keep the house in good condition.	2. Developing a schedule of work with reference to house keeping.
(*b*) Insect and pest control. Preventive and remedial measures to be adopted.	3. Minor repairs—Replacing fuses and washer for faucests.

Theory	*Practical*
9. Financial consideration in housing : (*a*) Availability of funds for housing : housing as one of the necessities, meeting housingcost with current income. Loans for family housing. (*b*) Desirability of owing versus renting. Responsibilities of renter and owner. (i) Maintenance (ii) Legal obligations—taxes, titles etc. Housing as a family investment. (*c*) Property insurance. 10. Problems of housing in India—Improving housing condition in India—rural and urban. 11. Role of government and other agencies : Housing Boards. Co-operative Societies. National Building Organisation. Rural and Urban Housing Scheme Slum Clearance.	

Theory	*Practical*	*Project*
1. Introduction to Household Economics.	Classification of individual wants.	
2. Human wants and their nature and classification. The concept of marginal utility. Law of diminishing marginal utility and the law of substitution and their application. Principles of equi-marginal utility. Wealth and its meaning.		
3. Standard of living. Constituents of the standard of living. Indian standard of living. How to raise the standard ?	Plan a survey of living standards of members in your institution.	Illustrate various levels of living in the city. Find out the local rates of wages for skilled, semi-skilled and unskilled workers.
4. Family income—Money income and real income. Sources of income. How to supplement the family income ? Individual contributions by the family members. Subsidiary occupations. Economic independence as applying to the unmarried man or woman, the married man or woman.	Debate on Advisability of outside career for women.	Elicit from working mothers their reasons for working outside the home. The study of possibilities of part time and full time gainful employment for the rural and urban house wife in your city.

Theory	Practical	Project
5. Family expenditure (Family income management). Family budget—its main items. Engel's law of consumption. Kinds of household consumption. Budget studies. Money verses commodity budget. Financial records of the household. Their purpose and nature. Waste in the household. The source of waste and inefficiency in the household. Family debts.	Draw up a personal budget.	Compare the budget of different types of families—married couples and unmarried man and woman.
6. Household purchase. Functions of money, General price levels ; how to read cost of living ; Index numbers. When, where and how to purchase. Consumer's surplus. Markets, fairs, Consumers Co-operative Stores. Cash purchase and credit purchase. Wholesale and piece-meal purchase. Adulteration of food and other materials.	Study of prevailing food and clothing prices. Study of packaging economy in various sized containers of the same quality food. List of food stuffs which could be purchased annually, monthly and weekly. Comparison of the cost and utility of ready-made and home made goods in clothing.	Visit ten retail and wholesale shops to learn price levels. Compare retail and wholesale prices for certain foods such as rice, dhall, ghee and oil for a period of three months.

Theory	Practical	Project
Consumer action in abolishing adulteration practices. The influence of taxes on articles of household consumption. The main Indian taxes.	Careful study of advertising methods.	Visit to consumer Co-operative stores.
7. Household production. Household production and national economy. The old and self-sufficing home and the modern home. Growing dependence of home or organised industry. Significance of production and consumption for the home maker. Population—quantity and quality centre in the household. Malthus theory —principles of growth of population.	Money value of products produced by the housewife in a year of house keeping. Meal management — Clothing management, any others.	
8. Saving in the family. Need for saving. Temporary and permanent institutions for small and big savings. Post-office, Chit fund, Nidhi, Banks—different kinds of account, how to open an account. Cheques and their uses. Insurance—its chief principles. Types of policies. The best type of investment for the common family. Criteria for judging a family	Methods of saving for a college student. A survey of different types of thrift and saving institutions in the community. Promissory note, mortgage bonds, stocks and shares.	Secure individual estimates as to household capitals in homes you know best as to its value, history of occupation and annual replacement and repairs.

Theory	*Practical*	*Project*
investment. Inheritance and bequest. The influence of inheritance laws upon family. The advantage of system of free-dom. of bequest. Compulsory equal divisions and primogeniture. How to make a will ?		
9. Labour in the home. The house wife the chief labourer. Share of husband and children in house work. Leisure in the family.	List of items of work contributed by the individual student to the total upkeep of the family. Survey of the contribution to house work made by the man of the family in 20 or more households.	
10. Equipment in the home. Labour saving devices and their relative advantages. Selection, use and care of cooking utensils, refrigerator and water heater.	Comparison of the different types of labour saving devices in relation to time and money management. Experience in living in home management residence at least for 10 days carrying full responsibilities under the guidance of the lecturer in groups of six to eight. To maintain record of activities, time schedule, money expenditure and menu.	Survey of 10 shops to study about the available labour saving devices.

Sl No.	*Author*	*Reference books and title*	*Publisher*	*Year*
1.	Kyrk, H.	Economic Problems of the Family (1st ed.).	Harper & Brothers, Publishers, New York	1933
2.	Andrews, B.R.	Economics of the Household	The Macmillan & Co., New York	1935
3.	Nickell, P. Dorsey, J.M.	Management in Family living (3rd ed.)	John Wiley & Sons, Inc., New York.	1960
4.	Kelly, P.C.	Consumer Economics, (1st ed.)	Richard D. Irwin, Illinois	1953
5.	Poet, L.J., Thye, L.S.	Household Equipment (5th ed.)	John Wiley & Sons, New York	1965
6.	Ehrenkraenz, F., Irman, L.	Equipment in the Home	Harper & Bros., New York	1958
7.	Goldstein, H. Goldstein, V.	Art in Everyday Life (4th ed.)	Macmillan & Co., New York	1966
8.	Crain, H.T., Rush, C.D.	Homes with Character	D. C. Heath & Co., Boston	1965
9.	Graves Maitland	Art of Colour and Design (2nd ed.)	Mcgraw-Hill Book Co., Ltd., London	1951
10.	Rutt, A.H.	Home Furnishings, (2nd ed.)	John Wiley & Sons, New York	1961

Sl. No.	Author	Reference books and title	Publisher	Year
11.	Hardy, K.	How to make your House a Home	Funk & Wangnells Co., New York	1947
12.	Trilling, H., Williams, F.	Art in Home and Clothing	J. P. Lippincott Co., Philadelphia	1936
13.	Deshpande, B.S.	Modern Ideal Home for India, (2nd ed.)	United Book Corporation, Poona	1943
14.	Lewis, O.S. Kurns, J.O. Eather, F.	Housing and Home Management, (2nd ed.)	Macmillan & Co., Ltd., New York	1963
15.	Devandas, R.P.	Text-book of Home Science, (2nd ed.)	Directorate of Extn., Ministry of Food and Agriculture, New Delhi	1967
16.	Agen, T.	The House and Its Plan and Use	J. B. Lippincott Coy, New York	1956
17.	Johnson, et al	Building or buying a House	McGraw-Hill Co., New York	1945

Journals

1.	Journal of Home Economics	American Home Economics Association	1600 Twentieth St. N.W. Washington D. C. 9.
2.	Journal of Home Science	Home Science Association of India—	

TEXTILES AND CLOTHING

Objectives :

The course in general enables the students :

1. To study clothing as related to health, comfort and economy.
2. To understand clothes as related to personality.
3. To gain aesthetic sense for personal and family development.
4. To construct garments for herself and the family.

2 Consecutive hour week

Theory	*Practical*	*Related experience*
1. Introduction to the field of Textiles and Clothing—Major goals.	Textile Chemistry : Practicals to be done as would relate to :	
	1. Knowledge in examining Fabrics for quality by determining : (*a*) Thread count (*b*) Identification of weave (*c*) Identification of finishes (*d*) Identification of prints and design.	1. Role of Textiles in Home making.

Theory	*Practical*	*Related experience*
2. Classification of fibres : Cellulose Protein—Mineral—Thermoplastic—Fibres under each group—their manufacture—processing and properties related to end-use-care.	2. Knowledge in care of fabrics. (*a*) Tests that would help in identification of fibres—Burning test, microscopic appearance—effects of acid, alkali and specific reagents. (*b*) Action of acid food stuffs like tamarind and fruit juice. (*c*) Action of alkalies—soaps, detergents, perspiration. (*d*) Specific chemicals like Acetone (nail polish) Phenol etc. (*e*) determining fabric shrinkage. (*f*) effect of Sunlight, mildew, dry heat, boiling, bleaching } On strength and colour of fabrics.	2. Field Trip : To one or two Textile Mills. Assignment : Growth of Textile industry in India—consumption pattern of Textiles — average clothing person.

Theory	*Practicals*	*Related experience*
3. Yarn construction : Process of spinning—classification into simple—complex and novelty yarns—Their durability—appearing and Texture crepe yarns and crepe fabrics.		3. Visit to Khadi Spinning and Weaving Centres—Use of novelty yarns in furnishing fabrics—collecting fabric swatches.
4. Fabric construction : Weaving—knitting—Felting—Brading etc. Basic weaves—Plain, twill and satin and variations—their durability—appearance —Texture Figure weave—pile weave —Jacquand weave.		4. Visit to handloom houses, Khadi Gramodyog Bhavan shops. Thread count in fabrics—examining various weaves — collection of fabric swatches.
5. Fabric finishes : Basic finishes—Boiling, Bleaching, Calendering, dosizing weighing, sizing, Beetling, degumming, mercerizing, Texturishing, finishes—napping, flocking, crepe finishes. Special purpose finishes, crease resistance and crease recovery—sanforizing and stabilization—water proof and water resistant—moth, mildew proof—fire proofing chemical finishes—Acid and Alkali finishes.		5. The newer finishes on the market collection of advertisement on finishes—experience in recognising finishes in the market.

Theory	*Practical*	*Related experience*
6. Colour in fabrics—Dyeing Classification of dyes, Acid, Basic, Mordant, Chrome, Naphthol, vat and developed dyes. Methods of dyeing—stock, yarn piece, cross dyeing—union dyeing—solution dyeing. Dyeing and Printing techniques Indegenous dyeing and printing methods—Hand-printing Block, Batik, Tie and dye—Stencilling—silk screen. Machine Printing—Roller Printing—discharge—resist chemical Printing—etching, Islet :	1. Introduction—scope of work in clothing construction. 2. Sewing equipment : (*a*) Selection and purchase (*b*) Use and care. 3. Sewing machine : (*a*) Name and purpose of important parts. (*b*) Threading, stitching adjusting the machine. (*c*) Simple adjustments (*d*) Use and care. Basic Hand stitches—Running, Basting, Back stitch—hemming, Buttonhole stitch.	Recognising different type of design in fabrics—collection of sample—visit to printing centres—Government textile design centres. Practical experience in learning any one technique of hand printing.
7. Selection of fabrics for Garments : (*a*) Based on Personal characteristics and needs.		7. Visit to shops to help them to make good choice in Fabric selection. This can be fabric selection for garment construction in the practical class.

Theory	*Practical*	*Related experience*
(*b*) Based on knowledge of Textiles such as Fibre properties—waves—finishes—prints.		
(*c*) Quality in Fabrics—Thread count, cloth count—slippage grain-off and on grain patters—shrinkage—textile labels reliable brand names.		
(*d*) Based on size of Budget.		
Care of clothes :	Care of clothes :	
1. Laundry equipment and Laundry reagents. Minimum requirements—availability—effective arrangement of space and equipment—purchase and maintenance of equipment.	1. Determination of hardness in water use of Softening agents—Borax, Ammonia—Sodium per borate.	
2. Water—hard and soft water—methods of softening water.	2. Stain Removal. (*a*) Types of stain and stain removers. (*b*) Method and procedure for removing of common stains.	Assembling of laundry equipment—work centres effective arrangement of space and equipment.

Theory	*Practical*	*Related experience*
3. Soaps and detergents—cleansing action of soap—Indegenous cleaning agents like Rita Nut Shikakai—Green gram—bran solution.	3. Laundrying of white cotton, coloured cotton, rayon, silk, wool, nylon, and lace.	
4. Stiffening agents—natural and commercial starches—Preparation of starch use.	Clothing construction : 1. To the extent possible more freedom in choice of pattern and various styles should be given to students. Interpretation of styles ; fashion in making pattern will develop the creative ability or skill in students.	
5. Common Bleaching agents—Blueing agents—their application—optical Blues.	2. In garment construction experience in one other fabric other than cotton like silk, synthetics is suggested.	
6. Principles and methods of laundering—application of friction—hand friction rubbing and scrubbing—Application of light pressure—kneading and squeezing—suction. Washing — Use of washing machine methods of finishing—damping—ironing.	1. Body measurements—needed measurements—methods of taking accurate measurements. 2. Construction of Sari—Petticoat : New learning experiences : (*a*) Principles of drafting (*b*) Fabric selection	

Theory	*Practical*	*Related experience*
	(*c*) Fabric preparation (*d*) Cutting pattern (*e*) Stay stitching (*f*) Seam and seam finishes (*g*) Darts (*h*) Placket opening (*i*) Waist band (*j*) Hems. Evaluation of work-Cost 3. Construction of a choli : New learning experiences. (*a*) Further principles of drafting as related to upper portion of figure. (*b*) Preparation for fitting in unbleached cotton.	

Theory	*Practical*	*Related experience*
	(*c*) Checking of fit—alteration.	
	(*d*) Transfer of alteration to paper patterns.	
	(*e*) Fabric selection for choli.	
	(*f*) Seams and seam finishes.	
	(*g*) Neck-Blas faxing and building.	
	(*h*) Lower edge—Bias facing fitted facing.	
	(*i*) Fit-in-sleeve.	
	(*j*) Fasteners—hooks and eyes Evaluation of choli-Cost.	
7. Methods of laundering—cotton—silks—wollens—Rayon nylon—lace.		
8. Principles and methods of dry cleaning.		
9. Storage of clothes—daily and seasonal.		

Theory : 3 hours.
Practical : 2 consecutive hour/week.

Theory	*Practical*	*Related experience*
1. Socio Psychological aspects of clothing.	1. Infants garment—New learnings: (*a*) Fabric selection. (b) Garment design. (c) Construction techniques based on design selected. (d) Embroidering—design—colour and finishing. (e) Evaluation—Cost.	Market survey on ready to wear garments and reporting on quality of cloth, garments construction fit and cost.
2. A knowledge of ready to wear clothing—Examination of garments for quality of cloth—Garment construction and fit.	2. Pre School Child—Self-help garment: (a) Fabric selection. (b) Garment design with self-help and growth features. (c) Construction techniques based on design selected. (d) Evaluation—Cost.	

Theory	Practical	Related experience
3. Clothing needs of the family Influence of age, sex—socio economic status—religion occupation—climate Personality.	3. Romper or suit Nor Man's Pyjama : (a) Fabric selection. (b) Garment design. (c) Construction techniques based on design selected. (d) Evaluation—Cost.	
4. Selection and buying of clothing for a growing family at different economic levels—infant—Pre-school, Grade school ado-lescent, adults.	4. Grade School frock : (a) Fabric selection. (b) Garment design. (c) Construction techniques based on design selected. (d) Evaluation—Cost.	
5. Personal characteristics and needs related to choice of colour—fabric—design and pattern in clothing.	5. Boy's Shirt : (a) Fabric selection. (b) Garment design. (c) Yoke.	

Theory	*Practical*	*Related experience*
	(d) Collar. (e) Front facing. (f) Pocket. (g) Button and Button-holes. (h) Evaluation—Cost.	
6. Wardrobe planning—Principles of planning—Analyzing and planning for a college girl's Wardrobe.	6. Care of clothes : Simple mending—draining and patchiing.	
7. Varieties of Indian fabrics used for dress. Coimbatore, Adyar, Venkatagiri, Poona, Chanderi, Ghadwal, Kanjeevaram, Dharmavaram, Bengal, Kashmir, Mysore, Patola, Banares.		
8. House-hold linen—Types of linen choice and selection—table linen, towels, bed linen.		
9. Furnishings—Selection and use of curtain and draperies.		

Theory	Practical	Related experience
10. Organisation helping the Textile Industry—Handloom and Khadi Boards—Weaver's centre—Ahmedabad—Textile Re-search Association—Bombay Textile Re-search Association.		
11. Indian Embroidery—traditional ones.		

III. Suggested References :

1. Design in Indian Textiles—The Indian Institute of Art in Industry—Artistry House, Calcutta.

2. Dantyagi, S.—Fundamentals of Textiles and their Care—Orient Longman's Ltd., 1964, Second Edition.

3. Doongajee, S., Deshbande—Basic Processes and Clothing Construction—New Raj Book Depot, Delhi.

4. Denny—Fabrics—J. P. Lippincott Co., N.Y.

5. Erwin M.P., Kuichen, L.A.—Clothing for Moderns—Macmillan Co., N.Y., 1965, Third Edition.

6. Encyclopaedia of Textiles—Prentice Hall, N.Y.

7. Hollen N., Saddar J.—Textiles—The Macmillan Co., N.Y., 1964, First Edition.

8. Lewis, Etal—Clothing construction and Wordrobe Planning—Macmillan, N.Y., 1957.

9. Indian Textiles—Government of India Publication Division.

10. Wingale, I.—Textile Fabrics and their Selection—Prentice Hall Inc., N.Y., 1965, Fourth Edition.

11. Deulkar, D.—Household Textiles and Laundry work—Atma Ram & Sons, 1951.

12. Thompson, H.M. and Rea L.E.—Clothing for Children—John Wiley & Sons, N.Y., 1949, First Edition.

CHILD DEVELOPMENT

Objectives :

To enable students :

1. Understand the principles of Child Development and the importance of childhood.

2. Understand child behaviour through different methods of child study.

3. Understand prenatal and postnatal development and the process of child birth.

4. Have a knowledge of the growth and development during infancy and the care necessary.

5. Develop an understanding of the normal growth and development of the child during the period 1—6 years.

Theory

1. The principles of growth and development. Factors that influence growth and development.

2. Methods of child study, with special emphasis on case study and observation methods.

3. Prenatal life and birth :

   (a) Pregnancy : signs, discomforts and complications.

   (b) Physical and psychological care of the mother during pregnancy. Prenatal influences.

   (c) Stages of prenatal development—Fertilization, implantation, the embryo and the fetus.

   (d) Child birth : Stages of child birth, types of delivery.

   (e) Post-natal care of the mother.

   (f) Maternal and infant mortality—causes and prevention.

4. The new born or the Neonate : (the first month of life).

   (a) Appearance, size and proportion.

   (b) Physical care and daily routine : Feeding—natural and artificial bathing, clothing and sleeping.

   (c) Health and Hygiene.

   (d) Behaviour patterns.

5. The first year of life :

   (a) Growth and development in the first year of life.

(b) Physical care—feeding, sleeping, clothing.

(c) Health care and hygiene.

(d) Common ailments.

6. The child from 1—6 years :

(a) Physical and motor growth.

(*b*) Language and intellectual development.

(c) Emotional and social development.

(d) Health care and hygiene.

(e) Ailments, accidents and common diseases.

(f) Habits and habit formation.

(g) Discipline and disciplinary methods.

(h) Character development.

(i) Maladjustments in children—causes, types and how to deal with them.

(j) The value of play, Selection of toys.

Lecture : 3 hours/week
Practical : . . 3 hours/week

Objectives :

To enable students :

1. Understand the philosophy and aims of Nursery Education and its value to children, parents and community.

2. Gain experience in planning and carrying out a creative programme to suit the needs of young children.

3. Gain practical experience by observation and participation in the Nursery School.

4. Understand the growth and development of the child during the period 6—12 years and study his needs during this period.

5. Gain knowledge of the needs, interests and problems of the adolescent, his relationship to the family, his friend and peers and community.

6. Understand the functioning of the family and the inter-personal relationship within the family.

Theory

1. Nursery Education :

(a) Nursery Education—The value of the Nursery School in the present day Indian setting.

(b) The Nursery School—Physical set up, equipment and personnel.

(c) The Home and Nursery School.

(d) The value of play and other Nursery School experiences.

2. The School years (6-12 years)

(a) Physical and motor growth.

(b) Language and intellectual development.

(c) Emotional and social development.

(d) Needs and interests of the school child.

(e) Health, care and hygiene during the school years.

(f) Children's common diseases during this period.

(g) The importance of healthy home—school relationships.

3. The Adolescent :

(a) Adolescence—Physical and Psychological changes during adolescence.

(b) Needs, interests and problems of the Adolescent.

(c) Personality Development.

(d) The influence of the peer group.

(e) The value of healthy relationships between the adolescent, his home and community.

(f) Delinquency in children.

(g) Sex education.

4. Family Relationships :

(a) The evolution of the Indian family—the Joint family and the nuclear family—system.

(b) The role and functions of the family.

(c) The place of the individual man, woman and child in the family.

(d) Marriage-functions, adjustments and factors affecting.

(e) Achieving harmonious interpersonal relationships in the family.

(f) The role of parents and the family in the over-all development of the child.

(g) Family disorganization—factors affecting it.

(h) Old age—psychology of old age, family attitudes towards the aged.

(i) Family planning.

Practical

1. Overall observation of :

(a) Physical set-up of Nursery School.

(b) Equipment.

(c) Pupil-teacher ratio.

(d) Daily programme.

2. Observation of Nursery School children to note :

(a) Physical development.

(b) Language development.

(c) Social development.

(d) Intellectual development.

3. Having experiences in planning and carrying out : play activities, science experiences, story-telling, toy making and preparing snacks for children.

4. Detailed observation and case history of one child.

5. Maintaining a record of observation of children and home visits.

References

Sl. No.	*Author*	*Title of the book*	*Publisher*	*Year*
1.	Spock Benjamin	Baby and Child Care	Pocket Book Inc.	1958
2.	Gardner, Bruce, D.	Development in Early Childhood The pre-school years	Harpes and Row, New York	1964
3.	Strang, Ruth	An Introduction to Child Study	Macmillan & Co., New York	1954
4.	Breakenridge, M.E. and Vicent, E., Lee	Child Development	W. B. Saunders & Co.	1956
5.	Hurlock, E.B.	Child Development	McGraw Hill Co., New York	1950
6.	Breakenridge, Marian E. Murphy Margeret Nestiti	Growth and Development of the Young Child	W. B. Saunders & Co., Philadelphia	1958
7.	Read, K.H.	The Nursery School	W. B. Saunders & Co.	1955
8.	Crow and Crow	Adolescent Development and Adjustment	McGraw-Hill Book Co.	1956
9.	Malm and Jamison	Adolescent	McGraw-Hill Book Co.	1952
10.	Burgess, E.W.	The Family	American Book Co., New York	1953
11.	Foster, Robert, G.	Marriage and Family Relationships	Macmillan & Co.	1952
12.	Skindmore, Rex, A., Cannon, Arthur, S.	Building Your Marriage	Harper Bros., Publisher, New York	1958

Journals

1.	Childhood Education	Journal of the Association for Childhood Education, International, Washington.
2.	Social Welfare	Central Social Welfare Board, New Delhi.
3.	Journal of Home Science	Home Science Association of India.

Elective

SOCIOLOGY

Objectives :

To help students :

1. Become aware of the nature and conditions of the society in which they live.
2. Get a balanced perspective of social life and social issues.
3. Develop a sense of appreciation and pride, in their society.
4. Maximise their contribution to society's welfare and progress.

2 hours/week

Theory	*Practical and related experience*
1. Definitions—scope—relation to other sciences. methods of study—Human Society and Culture.	Observation of cultural unity and difference in India. Film shows and discussions on cultures outside India.
Environmental adjustment and Culture.	

Theory	*Practical and related experience*
2. Society and individual—Socialization—development of personality.	Observation of children imitating and taking suggestions film shows from different cultures showing children imitating and taking suggestions.
3. Social processes—competition—conflict—accommodation—assimilation.	Film shows—seminars on accommodating and assimilating different religious, linguistic groups in India.
4. Introduction to Social Structure—Social Institutions : the Social institutions in India—the Domestic institution (family and marriage)—the Education (Society's formal socialising institution)—Religion (the normal and spiritual)—Economic institution (the self-maintenance agencies)—Government (the over all control institution of societies)—Indian political society—Welfare State.	Discussions on Social Institutions in India. Organisation of mock parliament.
5. Social groups—association, assemblies, crowd and mob. Biological groups—age, sex, race—Occupational groups—Social Stratification—class—Caste system in India—Linguistic groups—religious groups—Regional groups—World groups—Origin and development of U.N.O.—The idea of world Government—Role of U.N.O. in solving social problems.	Observation of groups among students and local area. Debates on the groups within the local area. Film shows on Social groups. Debates on the success and failure of U.N.O.

Theory	*Practical and related experience*
6. Rural Social life—Rural social institutions joint family, caste in the village level—Panchayats Religion and beliefs at village level—Principles of rural reconstruction—Community Development and National Extension Service—Five Year Plans —Co-operative organisations for rural reconstruction.	Film shows on rural life in India and other countries— Community Development and rural reconstruction in India and other countries. Visit to a village to observe the village level organisations at work. Seminars on rural reconstruction work in India. Stay at a village for a few days to know the rural social institutions.
7. Urban Social life—The rise of cities—migration to urban areas. Problems of urban society anonymity—overcrowding—slums—slum clearance work housing—housing programme of the state and private sector—health—transport recreation—delinquency and crime—programme to tackle delinquency and crime.	Visits to the crowded area of the city to observe the special problems. Visits to slum area. Film shows on the city life in other parts of the world. Discussions on recreations in the urban and rural areas. Observation of social welfare agencies at work in the urban area.
8. Social change—Rate of change—Social planning—Five Year Plans—Social welfare programme—Social controls and change. Social problems—Population trends—death and birth rates—standard of living—poverty—unemployment—malnutrition—Beggary—Child labour—Illiteracy and ignorance—conservatism—women and their status—Purdah. Social legislation in India.	Visits to social welfare agencies—old age institution—destitute home—handicapped children's home. Discussions on social controls—formal and informal—traditional.

(A record of the practicals must be submitted to the University)

Books for Reference

Sl. No.	*Author*	*Title*	*Year*	*Publishers*	*Price*
1.	S. C. Dube	Indian Village	—	Routledge and Kegan Paul Ltd., Broadway House, 68-74, Cater Lane, London E C 4	Rs 25-00
2.	Dr. C. B. Marmoria	Social Problems and Social Disorganisation in India	1960	Kitab Mahal, Allahabad, Bombay, Delhi, Hyderabad.	Rs. 12-00
3.	William, F. Ogburn Mejer F. Nimkoff	A Hand book of Sociology	—	Routledge and Kegan Paul Ltd., Broadway House, 68-74, Cater Lane, London E C 4	Rs. 25-00
4.	Sutherland, Woodward and Maxwell	Introductory Sociology	—	Oxford & I B H Publication (Indian Edition)	Rs. 8-00
5.	Anderson and Parker	Society 1 top Organisation and operation		D. Van Nostrand Co , Oxford & IBH Publishing Co., (Indian Edition) New Delhi	Rs. 10-00
6.	G. R. Madan	Changing Pattern of Indian Villages	—	S. Chand and Co., New Delhi	Rs. 15-00
7.	M. M. Srinivas	Social Change in Modern India	—		Rs. 25-00

Sl. No.	*Author*	*Title*	*Year*	*Publishers*	*Price*
8.	Ensimger, Douglas	A Guide to Community Development	—	The Ministry of Community Development, Government of India	—
9.	A. R. Desai	Introduction to Rural Sociology in India	—	The Indian Society of Agricultural Economics, Bombay. Vora & Co., P. Ltd., Publishers, Bombay.	Rs. 12-50
10.	The Directoı of Extension and Training	Towards A Welfare State	1956	Ministry of Agriculture, Government of India, New Delhi.	—
11.	Manilal, B Nanavathy and J. J. Anjara	The Indian Rural Problems	1960	The Indian Society of Agricultural Economics, Bombay.	Rs. 20-00
12.	Mark Abraham	Social Surveys and Social Action	—	William Henieman Ltd., Melbourne, London, Toronto.	—
13.	Johnson	Sociology—A Systematic Introduction	—	Allied Publishers Pvt. Ltd. Indian Edition.	Rs. 12-50

Sl. No.	Author	Title	Year	Publishers	Price
14.	S. K. Dey	Community Development	1962	Kitab Mahal, Hyderabad	Rs. 7-50
15.	Edward H. Spicer	Human Problems on Technological Changes	1952	Russel Sage Foundation, New York	—
16.	Wilbert, E. Moore	Social Change	—	Prentice Hall Inc., Englewood Cliffs, New Jercy	$ 1-50
17.	Dr. S. Chandrasekhar	Population and Planned Parenthood in India	—	George Allen and Unwin Ltd., Ruskin House, Museum Street, London.	—
18.	UNESCO	Social Change and Economic Development	—		$ 20-00

Journals

Sl. No.	*Title*		*Publishers*
1.	Panchayati Raj	Monthly	Publication Division, Old Secretariat, New Delhi-110 006.
2.	Rural India	Monthly	Ishwardas Mansions, Nana Chowk, Bombay-400 007.
3.	Social Welfare	—	Publication Division, Old Secretariat, New Delhi-110 006.
4.	Yojana	Weekly	Business Office, Publication Division, Old Secretariat, New Delhi-110 005.
5.	Journal of the University of Bombay, (History, Economics and Sociology)	Semi Annual	Bombay University, Bombay-400 001.
6.	Sociological Bulletin		Secretary, Indian Sociological Society, Rajsri Mansion, 2nd Floor, Near 3rd Pasta Lane, Colaba, Bombay-400 005.

ELECTIVE—HOME SCIENCE EXTENSION METHODS

Objectives :

(a) To stimulate students develop an awareness of and interest in rural life and programmes.

(b) To help students understand the objectives of Community Development and Extension Schemes in India.

(c) To spread scientific and practical information on Home Science into the community.

(d) To help students become better teachers, planners and leaders.

2 hours/week

Theory	*Practical*
1. Origin—History—Objectives of the Community Development and Extension Services in India.	Field trip to Block Development Centres and gaining experience by actual participation in rural extension work along with other extension personnel.
Present organisation of Community Development—the Panchati Raj System.	Visit to Gandhi Gram, T. Kallupatti, Bhavanisagar Centres.
Role and function of extension personnel at different levels. Opportunities for extension jobs the need for periodical ' inservice ' training.	
Role of Home Science in Community Development.	

Theory	Practical
2. Extension Service and Community Development in other Countries.	
The U.S.A.—the Land Grant Colleges of Agriculture and Home Economics in Extension work—Home Demonstration and 4-H clubs.	Symposia can be arranged wherein extension personnel can be invited to participate.
Extension Service in Japan and Europe.	
	2 hours/week
1. Programme Planning and implementation.	
(a) Basis for programme planning. The needs of the families and the village, Cultural, Social and Economical aspects of rural life.	
(b) Characteristics of rural life in India—Proportion of families engaged in farming—their problems.	
Women's role in farming—wastage in farm and household practice. Provision to improve rural homes health, childcare, education—income, conditions of work, recreation and other cultural activities.	

Theory	Practical
Efforts to improve the economic conditions of rural families through.	
1. Increased agricultural production by better farming techniques and management. Irrigation facilities, improved seeds and use of fertilizer.	
2. Supplementary occupations such as : bee-keeping, mat making, basket weaving, poultry, dairy, gardening.	
(c) Rural problems—collecting necessary information through surveys analysis and interpretation of data—finding solutions.	Conducting socio-economic surveys in a rural community.
(d) Planning programmes—steps in programme planning the importance of family approach in extension work. Planning for teaching by units : (Monthly, weekly and daily plans).	A study of rural problems.
(e) Working with people extension activities planned specially for women and children—youth activities—selecting groups according to their aptitudes interests and needs.	Planning, conducting and assessing simple village programmes for rural women, youth and chlidren.
(f) Developing rural leadership—the importance of voluntary workers in the programme.	

4 hours/week

Theory	*Practical*
1. Principles and methods of extension work.	
(a) The teaching and learning processes—the importance of communication—selling ' ideas '.	
(b) Responsibilities of the extension worker as a teacher—qualities of a good teacher to make teaching, learning process effective.	
(c) Extension methods, individual contact methods, group methods and mass media methods—advantages of each—selection of the suitable method.	Students to gain experience in extension methods by using each type and giving demonstration in related subject matter.
(d) Extension work requires many methods—relationship of cost and energy, to the number of people reached—evaluation of the teaching methods for further improvement.	
(e) Preparation and use of audio-visual aids in relation to extension work. Effective use of preparation of simple literature, pamphlets, Bulletins—Problems associated with villages in India illiteracy multiplity of languages lack of library facilities—Evaluation of teaching aids.	Experience in preparing simple visual aids—organising exhibits, conducting film shows and preparation of sildes. Organising puppet shows of educative nature. Preparation and use of Flash, cards, posters, charts etc.

Theory	*Practical*
(*f*) Evaluation in extension—what is evaluation—tools for evaluation—interpreing results—planning for future.	Preparation of checklists, rating sheets etc. and testing them as measuring devices.
2. Agencies co-operating in Extension work.	
(a) Co-operative societies—their functions in relation to rural credit and economy.	Attending meetings of the Voluntary agencies and planning programmes with them.
(b) Small saving schemes.	
(c) Voluntary agencies such as National Kasturba Gandhi Memorial Trust, Central Social Welfare Boards, Bharat Sevak Samaj and other women's organisations.	

Suggested References :

1. Rudramoorthy, B.—Extension in Planned Social Change, Allied Publishers Pvt. Ltd., 1966.

2. Mukerjee, B.—Community Development in India, Orient Longmans, 1961.

3. Extension Education in Community Development. Directorate of Extension, Ministry of Food and Agriculture, Government of India, 1961.

4. Five Year Plans—Issued by Government of India, 1951, 1956, 1961, and 1966.

5. Social Welfare in India—Publication Division, Government of India, 1956.

6. Facts of Planning—Publication Division, Ministry of Information and Broadcasting, Publication Division, Government of India, 1966.

7. Douglas Ensminger—A guide to Community Development, Revised Edition—Ministry of Community Development and Cooperation, Government of India, 1962 (free).

8. Jawaharlal Nehru—Jawaharlal Nehru on Community Development and Panchayatti Raj—Publication Division, Government of India.

9. A. R. Desai—Rural Sociology in India, The Indian Society of Agricultural Economics, 1961.

10. Lacuoria, C.B.—Social Problems and Social Disorganisation in India, Kitab Mahal, Allahabad, 1960.

11. Dale Edgar—Audio visual methods in teaching (Revised Edition), The Dryden Press, New Delhi, 1955.

ANCILLARIES

[For B. Sc. (Home Science]

ANCILLARY I—CHEMISTRY

(Regulations, Syllabus and Scheme of Examination is the same as for Group B—ancillary of B. Sc. General Course (Vide Syllabus No. 33 of Chapter XLII).

ANCILLARY II—PHYSICS

(Regulations, Syllabus and Scheme of Examination is the same as for Group B—ancillary of B. Sc. General Course (Vide Syllabus No. 32 of Chapter XLII).

CHAPTER XLIV

DEGREE OF BACHELOR OF MUSIC

(B. Mus)

(Three Year Degree Examination)

REGULATIONS :

1. Admission to the B.Mus. degree course shall be open to :

Conditions for Admission.

Candidates who have passed the Pre-University examination of this university with Indian Music as one of the optional subjects under Part III or an examination accepted by the Syndicate as equivalent thereto ;

Provided, however, it shall be competent for the Syndicate to permit a candidate who has passed Pre-University examination but has not taken Indian Music under Part III of Pre-University examination to join the B.Mus. degree course on the recommendation of the Head of the Institution.

2. The course of study shall comprise of the following subjects according to the syllabus to be prescribed from time to time. :

Course of Study.

PART I—LANGUAGES

(The Regulations, scheme of examination and syllabi are the same as prescribed for B.A./B.Sc. degree courses.)

The course shall comprise the study of any one of the following Regional or Classical or Modern (Indian or Foreign) languages at the option of the candidate according to the syllabi and text-books prescribed from time to time.

Regional language : Tamil

Classical : Sanskrit and Arabic

Modern :

(1) Indian : Telugu, Kannada, Malayalam, Gujarathi, Bengali, Urdu and Hindi.

(2) Foreign : French.

In the case of candidates whose mother tongue is not Tamil, a separate syllabus is prescribed for them.

The studies of detailed texts to be prescribed shall extend over a period of two years and the candidates shall be examined at the end of the first year and the second year in the texts prescribed therefor. There shall be three papers each of three hours duration carrying a maximum of 100 marks each.

PART II—ENGLISH

(The Regulations, Scheme of Examination and syllabi are the same as prescribed for B.A./B.Sc. courses.

The course should aim both at the further development of the language skills acquired by students in the Pre-University course and at the introduction of students

to English literature through the study of a few of the finest compositions in prose, poetry and drama in English literature.

Those two aims of the study of literature and language can really never be completely separated except in a technical study of language. For, in the last analysis, good literary composition in writing that conveys meaning or significance most effectively. Hence in the B.A./B.Sc. syllabus the two aims are to be held and pursued together, as far as possible in every part of the syllabus.

SYLLABUS

The course will comprise the following :—

(a) Language study (First year).

(b) Study of 20th Century Prose (First year).

(c) Introduction to the classic-poetry, drama and Pre-twentieth century prose (both years).

Part III — Music:

The course of study in Music under Part III shall comprise :

(a) the study of the following subjects :

(i) Musicology.

(ii) History of Music.

(iii) A special subject to be chosen from the following :—

1. Comparative Music.

2. Opera-one to be chosen.

3. Tamil Composition illustrating evolution of Tamil Music.

(b) (i) Intensive practical training in One major (2 practicals) and one ancillary to be chosen from the following list :

Main :

1. Vocal Music.
2. Veena.
3. Violin.
4. Flute.
5. Gottuvadyam.
6. Mirdangam.

(ii) Ancillary.

1. Vocal for Instrumental and Instrumental for vocal.

Additional subject under Ancillary :

2. Musicology Special.
3. Comparative Music.
4. Ancient Tamil Music.
5. Another Instrumental Music for Instrumental Major.

Note :

Since Comparative Music comes under special subject for major also, those offering for Comparative Music under special subject, should offer for any one of the other ancillaries (viz. Musicology Special, Ancient Tamil Music, Another Instrumental Music).

If any one of the following instrument is taken for major, another instrument from the remaining can be taken for Ancillary — Another Instrumental Music for Instrumental Major is as follows :

Veena, Fulte, Violin, Mridangam, Gottuvadyam, Nagaswaram.

Twenty ragas out of sixty ragas prescribed for the Main vocal. These twenty ragas should be different from those thirty ragas chosen for Main Instrumental Music.

PART I—LANGUAGES

3. The Scheme of examination shall be as follows :

Scheme of Examination. There shall be three papers each of three hours duration carrying 100 marks each.

PART I—Tamil

		Hours	Marks
At the end of the First year			
Paper I—	Prose and Drama ...	3	100
At the end of the Second year			
Paper II—	Poetry and Grammar ...	3	100
Paper III—	Comprehension, Composition History of Literature and Translation ...	3	100
(For the candidates whose mother tongue is not Tamil)			
At the end of the first year			
	One Paper ...	3	100
At the end of the Second year			
	One Paper ...	3	100

PART I—Malayalam

		Hours	Marks
At the end of the First year			
Paper I—	Prose (detailed and non-detailed texts) ...	3	100
At the end of the Second year			
Paper II—	Poetry, Classical Drama and Grammar ...	3	100
Paper III—	History of Malayalam Literature, Composition and Translation ...	3	100

PART I—Hindi

		Hours	Marks
At the end of the First year			
Paper I—	Prose and Drama ...	3	100
At the end of the Second year			
Paper II—	Poetry ...	3	100
Paper III—	Non-detailed, Translation and Composition ...	3	100

PART I—Arabic

			Hours	Marks
At the end of the First year				
Paper I—	Prose, Poetry and Grammar	...	3	100
At the end of the Second year				
Paper II—	History of Literature	...	3	100
Paper III—	Translation and Composition	...	3	100

PART I—Urdu

At the end of the First year				
Paper I—	Prose, Poetry and Grammar	...	3	100
At the end of the Second year				
Paper II—	History of Literature	...	3	100
Paper III—	Translation and Composition	...	3	100

PART I—Sanskrit

At the end of the First year				
Paper I—	Poetry, Prose and Grammar	...	3	100
At the end of the Second year				
Paper II—	Drama and Translation	...	3	100

(60 marks for Drama, 40 marks for translation i.e. from Sanskrit to English 25 marks, English to Sanskrit 15 marks, out of the 25 marks for translation from Sanskrit to English 15 marks should be allotted to passage from text and 10 marks for unseen passages.)

Paper III—	Poetics and History of Sanskrit Literature	...	3	100

PART I—French

At the end of the First year			Hours	Marks
Paper I—	Prose	...	3	100
At the end of the Second year				
Paper II—	Poetry and Drama	...	3	100
Paper III—	Translation and Essays	...	3	100

PART II—English

There shall be four papers each of three hours duration carrying a maximum of 100 marks.

At the end of the First year				
Paper I—	Twentieth Century Prose Grammar and Composition		3	100
Paper II—	Poetry and Drama I	...	3	100
At the end of the Second year				
Paper III—	Pre-Twentieth Century Prose and Composition	...	3	100
Paper IV—	Poetry and Drama II	...	3	100

PART III—Music

At the end of the First year				
Musicology I		...	3	100
At the end of the Second year				
History of Music		...	3	100
At the end of the Third year				
Musicology II		...	3	100
Main :—	Practical I (Musical Composition)	...	3	100

Main :—	Practical II (Raga, Alapana, Tanam, Pallavi Niraval and Kalpana Swaram)	3	100
Ancillary :—	Practical or Written paper	3	100
	Special Subject (Practical) ...	3	100

Conditions of Eligibility of A Candidate for The Degree.

4. No candidate shall be declared eligible for the Degree of Bachelor of Music, unless he has completed the course of study prescribed and passed the examinations in the several subjects contained in the course of study as detailed in the regulations.

5. A candidate shall not be declared eligible for the Degree of Bachelor of Music, unless he has passed the examination in the selected language under Part I, in English under Part II and in the optional subjects under Part III.

6. A Candidate for the Degree of Bachelor of Music shall be declared to have passed, if he satisfies the following :

PART I—LANGUAGES

Marks for a pass and Qualification of Successful Candidates.

Those who have obtained 35% of marks in that paper or 35% of marks taken together in the papers in that year are considered to have passed in that paper or in that year.

For purpose of classification, the total number of marks obtained in all the papers under Part I in the aggregate will be taken into consideration.

PART II—ENGLISH

Those who have obtained 35% of marks in both the papers taken together at the end of the first year are considered to have passed in that year.

Those who have obtained 35% of marks in both the papers taken together at the end of the second year are considered to have passed in that year.

For purpose of classification, the total number of marks obtained in all the four papers under Part II in the aggregate will be taken into consideration.

PART III—MUSIC

Those who have obtained not less than 35% of the marks in the written papers, not less than 40% of the marks in the aggregate in the written and the practical examinations, put together, are deemed to have passed Part III examination.

Classification of Successful Candidates.

7. Candidates securing 60 per cent and above of the total marks in any one of the Parts I, II and III shall be placed in the First Class in that Part. Successful candidates who obtain less than 60% but not less than 50 per cent of the marks in any of the Parts I, II and III shall be placed in the Second Class. All other successful candidates in Parts I, II and III shall be placed in the Third Class.

Candidates who obtain not less than 75% of the marks in the aggregate in Part III shall be declared to have passed the examination with Distinction.

Mark Statement.

8. Mark Statement shall be furnished.

SYLLABUS

Musicology — I

The two systems of music : Harmonic melodic and their features.

Melody, Polyphony and harmony

Fundamental technical terms and their meaning — sangita ; nada — anahata and anahata ; nadopatti ; marga and desi sangita.

Musicography : Detailed knowledge of the notation used in South Indian Music Swara nomenclature.

Musical terms : Sruti, Swara, Svarasthana and Sthayi, avarta, matra, gati, aksharakala and sangati.

Tho tala systems : The scheme of 35 talas Desadi and Madhayandi talas ; Chapu talas and its varieties ; Shadanga and shodasanga. The Tala dasa pranas ; Marga and Desi talas.

The raga concept : Raga lakshana in general, raga classification in detail.

The scheme of 72 melakartas. The names of the 12 chakras. The two nomenclature for 72 melas. Katapayadi for mela and its applications.

Alankaras : Gamakas.

Musical instruments of South India, like tambura, veena, violin, gottuvadhyam, flute, nathaswara, mridangam, and tavil. Detailed knowledge of their construction, technique of play and use.

Materials used in the manufacture of music instruments of ancient, medieval and modern time.

Tuning of stringed instruments : tambura, veena, gottuvadhyam and violin.

Lakshana of the following types of compositions.

Githa, svarajati, jatiswara, tana, varna, pada varna, kriti, kirtana, ragamalika, pada, javali, daru and tillana.

Decorative angas figuring in kritis.

Musicology — II

Manodharma sangita and its forms method in developing raga alapana, akalpana, swara and niraval. The exposition pallavi and the principles underlying it.

The theory of 22 srutis and the discussions relating thereto. Raga wherein they figure Nomenclature for the 22 strutis. Scales of just intonation and equal temperament.

Raga lakshana in detail.

Musical forms and their classifications, lakshna of musical forms figuring in at music, sacred music, dance, drama, opera and Kalakshepam.

Kinds of mudras, figuring in musical compositions.

Prabandha, Ttaya, suladi and other ancient forms.

Obsolete ragas, musical forms, musical instruments and musical terms.

Folk music and its characteristics. Folk instruments.

Musical Prosody.

Musical appreciation — styles of great composers. Critical study of two compositions each of Tyagaraja, Muthusamy Dikshithar, Syama Sastry and Gopalakrishna Bharati — ability to write appreciation essays on classical compositions.

Outlines of comparative music.

Development of contemporary music.

1. Mysore Vasudevachariar.
2. Tiger Varadachariar.
3. Nainapillai of Conjeevaram.
4. Veena Dhanammal.
5. Nilakanta Sivan.

An outline knowledge of staff notation. The important scales figuring in music of different countries of the orient and the Occident.

Voice culture : Types of sarira ; the larynx and the ear ; gayaka gunas and gayaka doshas.

Lakshna and Sanchara of the following ragas :

Todi	Kharaharapriya	Surati
Dhanyasi	Madhyamavati	Sama
Asaveri	Mukhari	Natakuraji
Punnagavarali	Abhogi	Sankarabharna
Ahiri	Sriraga	Bilahari
Mayamalavagaula	Sriranjani	Kedaram
Gaula	Darbor	Hamsadhvani
Saveri	Huseni	Suddhasveri
Bauli	Harikambhoji	Navaroj
Malayamarutha	Kambhoji	Kuranji
Chakravaka	Khamas	Purnachandrika
	Mohana	Nata
Saurashtra	Yadukulakamboji	Pantuvarali
Vasanta	Kedaragaula	(51st Mela)
Bhairavi	Sahana	Purvakalyani
Kirvani	Begada	Shanmugappriya
Anandabhairavi	Nilambari	Vachaspati
Kanada	Arabhi	Kalyani
Devamanohari	Atana	Saranga
Ritigaula	Devagandhari	

Acoustics : Musical sounds and their characteristics Pitch intensity timbre. The international philharmonic pitch. Absolute pitch and relative pitch. harmonics, beats, sympathetic vibration Intervals, consonance and dissonance.

Production and transmission of sound.

Reflection of sounds : Echoes, resonance, the laws of transverse vibration of strings and air-columns.

Gramaphone and the radio. Acoustics of concert halls.

History of Music

Origin and development of scales. Raga classification in ancient music. The Gram Murchana—Jati system ; Pantiram system ; Sudha-Chayalaga Sankirna system ; the trayodasa lakshanas mentioned for ragas in ancient Sanskrit works.

Musical forms and their evolution. Evolution of the concept of mela and the evolution of Mela Paddhati and Mela nomenclature sacred music in sanskrit and Indian languages and its growth. The origin and evolution of operas and dance dramas, Kuravanji nataka, Villi Bharatham.

The evolution of concert programme.

Origin and development of manodharma sangita.

Origin and development of Brinda Gana.

Evolution and history of the veena. Reasons for the exit of the yazh. Drones used in Indian music, their varieties and evolution.

History and development of South Indian music with special reference to the contribution of the following composers and lakshnakaras along with short biographies of them :

Ilangovadigal, Tirugnanasambandar, Appar, Sundaramurthi Nayanar, Narayana Thirtha, Kethetrajna, Sarangapani, Jayadeva Tallapakam Annamacharya, Purandaradas, Arunagirinathar, Kavikunjara Bharathi, Anayya, Pallavi Doraiswami Iyer.

Bhadrachala Ramdas	—	Ponnayya Pillai
Ghanam Sinyaa Mera	—	Merattur Venkatarama Sastri
Sadasiva Brahmendrar	—	Veenakuppayyar
Virabhadraiya	—	Pallavi Seshayyar
Matrubhoothaiya	—	Subbrama Iyer of Vaidiswarankovil
Ghanam Krishna Iyer	—	Ramaswami Sivan
Pallavi Gopala Iyer	—	Mysore Sadasiva Rao
Margadarsi Sesha Iyengar	—	Karur Dakshinamurthy Sastri
Pachimiriam Adiyappaiah	—	Patnam Subramania Iyer
Paidala Gurumurthi Sastri	—	Ramnad Srinivasa Iyengar
Ramaswami Dikshitar	—	Cheyyur Chengalvaraya Sastri
Tyagaraja	—	Tachur Singaracharlu
Muthuswami Dikshitar	—	Papavinasam Mudaliar
Syama Sastri	—	Maha Vaidyanatha Iyer
Swati Tirunal	—	Tiruvottiyur Tyagayyar

Muthu Thandavar	—	Marimutha Pillai
Muvvalur Sabhapathi Iyer	—	Dharmapuri Subbarayar
Arunachala Kavirayar	—	Patabhi Ramayya
Gopalakrishna Bharathi	—	Kotiswara Iyer
Subbaraya Sastri	—	Harikesanallur
Papanasam Sivam		Muthiya Bhagavathar

History of Indian music from ancient times with special reference to the works of the following lakshnakaras, and the contribution made by them :

Bharatha (Natya Sastra)

Matanga (Brahaddesi)

Dattila (Dattilam)

Parsvadeva (Sangita Samaya Saram)

Narada (Sangita Ratnaskara)

Narada (Sangita Makarandam)

Raghunatha (Sangita Sudha)

Ahobala (Sangita Parijata)

Somanatha (Taga vibotha)

Ramamathya (Svaramelakalanithi)

Venkatamakhi (Chaturdandi Prakasika)

Tulajaji (Sangita Saramirta)

Govindacharya (Sangraha Choodamani)

Principal seats of music during 17th, 18th and 19th centuries in South India, circumstances that occasioned famous compositions.

The influence of exotic music on the development of South Indian Music.

Sources for the musical history of India.

Special Subject

Any one of the following five subjects to be specialised :

(1) Comparative music

(2) Opera - an opera to be chosen one out of the following :

(a) Nandanar Charithram

(b) Villi Bharatham

(c) Rama Natakam

(d) Nowka Charitra

(e) Prahalada Bhakti Vijayam

(f) Kuravanji.

(3) Composition illustrating evolution of Tamil music.

Practical (Major)

35 Alankaras, 12 Sancheri Gitas, 4 Raganga Raga Lakshana Gitas, 4 Janya Raga Lakshna Gitas, 2 Svarajatis, 1 Svarajati of Syama Sastri, 2 Jatisvaras, 1 Suladi, 1 Prabandha and 1 Thya, 6 Aditala Varnas, 4 Varnas in talas other than Adi tala, 2 Ragamalikas, 2 Padas, 2 Ashtapadis, 2 Tarangas, 2 Javalis, 2 Purandaradas, 2 Tillanas, 2 Darus, 2 of Tygaraja's Pancharatna Kritis and 60 Kritis each in the prescribed ragas (see under theory). If the instrument in chosen as major, the number of Kritis may be 30.

Alapana of the prescribed ragas.

Ability to render given pallavis in Adi, Rupka, Triputa and Jhampa talas in the following ragas :

(1) Todi (2) Shanmugapriya (3) Saveri (4) Bhairavi (5) Natakuraji (6) Mohana (7) Kambhoji (8) Sankarabharana (9) Pantuvarali or Purvakalyani (10) Kalyani.

Rendering of Kalpana svaras to compositions learnt in the following talas :

Adi, Rupakam, Triputa, Chapu and Jhampa.

Note : The compositions studied shall as far as possible be representative of the composers mentioned under History.

Compositions taught shall be from the list of compositions of the Madurai University prescribed for the respective years.

Practical (Ancillary)

Number of compositions prescribed in para one of the main syllabus (Practical) ; all the compositions prescribed for the main examination and the alapana of the following ragas :

Todi, Shanmugapriya, Saveri, Bhairavi, Natakuraji, Madhyamavati, Kambhoji, Mohana, Sankarabharana, Bilahari, Purvakalyani, Kalyani, Sourashtra, Darbar-Kannada, Sahana, Atana, Anandabhairavi, Pantuvarali, Ritigaula, Mukhari, Khamas, Begada, Surati, Vasanta, Huseni, Suddhasaveri and Sri Raga, Kalpana Swara rendering in the compositions in Adi, Rupaka, Triputa and Jhampa talas.

In the practical examination candidates may offer vocal music or one of the following instruments : Veena, violin, gottuvadhyam, flute, nathaswaram.

Reference :

Mudaliar, A. M. Chinnasami : Oriental Music in European Note

Popley, H. P. : Music of India.

Sambamurthi, P. : South Indian Music

do Great composers.

do Dictionary of south Indian Music and Musicians.

do Practical course in Karnatic Music (Books 1-3) Annamalai University. Music series, Vols IV, V (Parts 1 & 2) and VI.

Ayyangar, K. V. Srinivasa : Thyagaraja Hridayam.

Sambamurthi, P. : Kirtana Sagaram, Books I & 2.

Bharathiar, Yogi Suddhanada : Tamil Isai Muzhakkam.

Saiva Siddhanta Works Publishing Society : Tevaram Proceedings of the Tevaram conference held under the auspices of Tamil Isai Sangam.

Pillai K. Ponniah : Isai, Iyal.

Kothandaraman, P. : Tamilar Isai Karuvigal, Annamalai University Publication.

Tachur Singaracharlu's works.

Thyagarayar, Tiruvottiyur : Pallavi Svarakalpavalli.

Dikshitar Subbarama : Sangita Sampradaya Pradarsini, Sangita Svaraprasthara Sangraham.

Pandithar, Abraham : Karnamirtha Sagaram.

Mudaliar, Manikka : Sangita Chandrigai, Svaramela Kalanidhi (Annamalai University Publication).

Sambamurthi, P. : Great Musicians.

Ayyar, C. S. : 120 Kritis of Thyagaraja in Notation.

Desigar, M. M. Dandapani : Tamil Isai Katturaigal.

Mahabharata Chudamani : (Music portions only) : U. V. Swaminatha Ayyar Library publication, Adyar.

Sruti Vadyas, S. I. M. IV and V.

Teaching of Music—Azhagar Kuravanji by K. Nagamani.

Sampradhaya Pradarsam—3 Vols, Music Academy, Madras.

Uthsava Prabhandas of Swati Tirunal—Swati Tirunal Academi.

Muzhavai Chidambara Bharathi's songs by Dr. P. C. Sitaramier published by the Madras Music Academy.

Uthsava sampradhaya Kritis of Theagaraja by S. Ramanathan.

Divyanama Kriti of Theagaraja by S. Ramanathan.

Prahladha Bhakthivijayam by S. Ramanathan.

Silappadhikarathu Isainunukkam by S. Ramanathan.

Gita Mala Part I and II by Srimathi Ambujam Krishna.

Laya Vadhyas by Prof. P. Sambamurthi.

Struthi Vadhyas by Prof. P. Sambamurthi.

Flute by Prof. P. Sambamurthi.

Musical composition of Papanasam sivam Part I and II.

Compositions of Swati Tirunal by Swati Tirunal Academy.

Acoustic in Tamil by R. K. Viswanathan, Annamalai University.

Spritual Heritage of Theagaraja by C. Ramanuja Chariyar, Ramakrishna Press.

Kavadi chindu by S. Ramanathan, Kalaimagal Isai Kalloori, Madras-5.

Kirthanamalai Part III—By Papanasam sivam.

Tamil Songs By Muthiah Bhagavathar.
Swati Tirunal Kritis Part I.

LIST OF RAGAS

1. Asaveri
2. Ahiri
3. Anandabhairavi
4. Arabhi
5. Atana
6. Abhogi
7. Bauli
8. Bhairavi
9. Begada
10. Bilahari
11. Chakravaka
12. Dhanyasi
13. Darbar
14. Devamanohari
15. Devagandhari
16. Gaula
17. Hindolam
18. Huseni
19. Hamsadhvani
20. Harikambhoji
21. Kharaharapriya
22. Kedaram
23. Kiravani
24. Kanada
25. Kambhoji
26. Kapi
27. Khamas
28. Kedaragaula
29. Kuranji
30. Kalyani
31. Mayamalavagaula
32. Madhyamavati
33. Mukhari
34. Malayamarutha
35. Mohana
36. Nata
37. Natakuranji
38. Navaroj
39. Nilambari
40. Purnachandrika
41. Pantuvarali
42. Purvikalyani
43. Punnagavarali
44. Ritigaula
45. Saveri
46. Sriraga
47. Sriranjani
48. Surati
49. Sama
50. Sankarabharana
51. Suddhasaveri
52. Saurashtra
53. Sahana
54. Shanmukhapriya
55. Saranga
56. Todi
57. Vasanta
58. Vachaspati
59. Varali
60. Yadukulakamboji

Musicology Special

I. *Music and Mathematics :* Tone system, Scales, Rhythm, Musical Instruments.

II. *Early experiments in Music :* Cycles of fifths, fourths and thirds Cents method, Arithmetical method.

III. *Tala :* 108 talas and other rare talas which do not occur under sapta talas and their varieties. Talas used in Thiru-pugazh.

IV. Murchanakaraka Melas and Murchanakaraga ragas.

V. Mela, Mela Paddhathi and Mela nomenclature.

VI. Vikrithi Panchama Melas and other systems of Melas.

VII. Raga and Rasa.

VIII. *Music and Temple :* Sarva Vadhya, Ritualistic Music and Dance, Urdhva Thandava, Musical stone pillars Musical Iconography.

IX. Significance of the Dhruva vina and chala vina (Bharatha's experiment).

X. Geographical and Historical factors and Music.

XI. Sources which provide material for the history of Indian Music.

XII. Lakshana of the following ragas :

Jagan mohini, Bhupala, suddha Bangala, Saraswathi, Navarasa Kannada, Hamsanandhi, Abheri, Lathangi, Simhendera madhyamam, Janaranjani, Hindolam, Kuntalavarali.

Comparative Music

1. Melody, Harmony, Polyphony.

2. Staff notation. Its advantages. Possibility of adopting staff notation for Indian Music. Different systems of Notation.

Symbols used in western and Indian (carnatic and Hindusthani) notation to denote gamakas. Ability to write simple Indian Melodies in staff notation.

3. Distinguishing features of western, Hindusthani and Carnatic Music.

4. Scales figuring in the different systems of Music. Major and Minor scales, Mela and Janya, Thats ;

Ecelisiastical modes and Margi ragas.

5. Tala in carnatic Music and in other systems :—

Western and Hindusthani : Time signature.

Angas and their equivalents in Western Music ; Modes of counting time in western Music.

6. Comparative study of Musical forms—Sacred and secular, in carnatic, Hindusthani and Western Music.

7. Musical Instruments in Indian and Western Music and their construction and technique of play.

Orchestra—Indian and Western. Opera—Indian and western Folk Music and its instruments.

8. The great composers in Western Music :—

Handel, Beethovan, Haydn, Chopin, Bach, Schuman Debussy-Wagner.

Note : Since comparative music comes under special subject for Major also, those offering for comparative Music under special subject should offer for any one of the other ancillaries (viz., Musicology special, Ancient Tamil Music, Another Instrumental Music).

Syllabus for Ancient Tamil Music

1. Muttamizh—Iyal, Isai, Natakam.

2. Reference to Music in silappadikaram and other Ancient Tamil works.

3. Technical terms used in Tamil Music and their equivalents in present day Music.

4. Raga classification in Ancient Tamil Music : Pan, Thiram Panniyalthiram, Tirathiram, The 103 puns. Grahabhedam in Tamil Music. Puns figuring in the Tevaram hymns and their equivalents. Puns in Nalayira Divyaprabandham. Puns pertaining to the different regions of Tamil Nadu.

5. *Tala :* Seer and Pani. The angas :—Kottu, Asai, Thooku, and alvu, the 108 talas. Rare talas in the Thirupugazh of Arunagiri Nadar.

6. Biographies of the composers of the Tevaram and Divyaprabandam, Manickavasagar.

7. Musical instruments of the stringed, wind and percussion groups mentioned in Ancient Tamil Literature. Yazh and its varieties.

Folk instruments and orchestra (Bands) of Tamil Nadu in Ancient times.

8. Patrons of Music and Musicians. Endowment created for Music.

Another Instrumental Music for Instrumental Major

1. If anyone of the following Instruments is taken for Major, another instrument from the remaining can be taken for Ancillary :

Vina, Flute, Violin, Mridangam, Gotuvadyam, Nagaswaram.

2. Twenty ragas out of sixty ragas prescribed for the Main vocal. These twenty ragas should be different from those thirty ragas chosen for Main Instrumental Music.

CHAPTER XLV

DEGREE OF BACHELOR OF ARTS (SPECIAL)

(B. A. Special)

(Three-Year Degree Examination)

REGULATIONS

Conditions for Admission.

1. Candidates for admission to the Degree of Bachelor of Arts (Special) shall be required to have passed the Pre-University Examination of this university or of any other University as equivalent thereto and to have subsequently undergone a prescribed course of study in an affiliated college of this university for a period of not less than three academic years or nine terms.

Course of Study.

2. The course of study shall comprise the following subjects according to syllabus to be prescribed from time to time.

PART I—Languages

TAMIL or HINDI

The course is intended to enable the students to express scientific and technical ideas and produce small essays and dissertations on technical subjects through the regional language. No text-books will be prescribed. The dissertation and composition may be supervised by the Department concerned with the help of the teachers in the main subjects, and the topic of dissertation will be

prescribed by the respective department. The study will extend over a period of one year and the candidate shall be examined at the end of the first year. In one paper of 3 hours duration carrying a maximum of 50 marks. Fifty marks is allotted for internal assessment.

PART II—ENGLISH

1. A course in the technique of reading passages with a bearing on Economics by recognised authors.
2. A course in the technique of making notes.
3. A course in the presentation of technical information in both speech and writing (Essays, Paras, etc.)

The course of study for Part II English shall extend over a period of one year and the candidates shall be examined at the end of the first year in one paper of three hours duration carrying a maximum of 100 marks. Fifty marks is allotted for internal assessment.

PART III—MAIN—Economics

Indian Economic Problems

Economic Statistics

Economic Development and Planning

Economic Thought

Economic Theory

Currency, Banking and International Trade

Public Finance.

ANCILLARIES

Mathematics I

Mathematics II

Scheme of Examination. 3. The scheme of examination shall be as follows :

PART I—Tamil or Hindi

		Hours	Marks
At the end of the First Year			
One paper	...	3	50
*Internal assessment	...		50

PART II—English

		Hours	Marks
At the end of the First Year			
One paper	...	3	100
*Internal assessment	...		50

PART III

		Hours	Marks
At the end of the First Year			
Indian Economic Problems	...	3	100
Economic Statistics	...	3	100
At the end of the Second Year			
Economic Development and planning	...	3	100
Economic Thought	...	3	100
Mathematics I—Ancillary	...	3	100
At the end of the Third Year			
Economic Theory	...	3	100
Currency, Banking and International Trade	...	3	100
Public Finance	...	3	100
Mathematics II—Ancillary	...	3	100

4. No candidate shall be declared eligible for the Degree of Bachelor of Arts (Special) unless he has completed the course of study prescribed and passed the examinations in the several subjects contained in the course of study as detailed in the regulations.

Conditions of Eligibility of A Candidate for The Degree.

5. A candidate shall not be declared eligible for the Degree of Bachelor of Arts (Special), unless he has passed the examination in the language under Part I, in English under Part II and in the optional subjects under Part III.

Marks for a pass and Qualification of Successful Candidates.

6. A candidate for the Degree of Bachelor of Arts (Special) shall be declared to have passed if he satisfies the following :

PART I

The candidate should obtain a minimum of 35 per cent of marks in the aggregate (i.e. for written and internal assessment put together).

PART II

The candidate should obtain a minimum of 35 per cent of marks in the aggregate (i.e. for written and internal assessment put together.)

PART III

Those who have obtained 35 per cent of marks in each paper in each year are considered to have passed in that paper.

For purpose of classification, the total number of marks obtained in all the papers under Part III in the aggregate will be taken into consideration.

Classification of Successful Candidates.

7. Candidates who obtain 60 per cent or above of the total marks in any one of the parts I, II and III shall be placed in the first class in that part. Successful candidates who obtain less than 60 per cent but not less than 50 per cent of the marks in any of the parts I, II and III shall be placed in the second class. All other successful candidates in Parts I, II and III shall be placed in the third class.

Marks statement.

8. Statement of marks shall be furnished.

SYLLABUS

B.A. ECONOMICS (Special) DEGREE COURSE

PART I—TAMIL

Three hours of instruction per week will be allotted for the study of the language.

Three periods per week may be allotted to the teaching of Tamil for the B.A. Economics special course for the first year :

(1) for producing effective translation of scientific and technical passages by the students

(2) for making the students write articles in simple and precise Tamil and

(3) for making the students review scientific books and articles and that one period for each division be allotted.

The following books for reference are recommended :

	Title of essay	Name of the book
1.	பொருள்நூற் கருத்துக்கள் (பக்கம் 180-200)	திருக்குறள் கனிகள்—டாக்டர் தெ. பொ. மீ. தமிழ் எழுத்தாளர் சங்கம், சென்னை.
2.	சோசலிசம் பற்றி மகாத்மாவின் கருத்துக்கள் (பக்கம் 647-663)	மகாத்மா காந்தி நூல்கள்-6 —காந்தி நூல் வெளியீட்டுக் கழகம், சென்னை.
3.	இந்தியப் பொருளியல்—மறுமலர்ச்சி (பக்கம் 33-43)	இந்தியப் பொருளியல்—டாக்டர் பா. நடராசன், சைவ சித்தாந்த நூல் பதிப்புக் கழகம், திருநெல்வேலி.
4.	வேலை (பக்கம் 64-78)	கிராம இயக்கம்—ஜெ. சி. குமரப்பா.
5.	வணிகவாதம் (பக்கம் 5-16)	பொருளாதாரச் சிந்தனை வரலாறு—டாக்டர் கே. எஸ். சோணாச்சலம்.

PART I—HINDI

Books for Reference :

1. Hamari Arthika Samasyayen by Giri Raja Prasad Gupta

2. Hamari Rashtriya Samasyayen

B.A. ECONOMICS (Special)

PART II—ENGLISH

(Syllabus)

1. Grammar :

   (*a*) Transformation of sentences ;

   (*b*) Change of Voice and Tense ;

   (*c*) Use of Articles ;

   (*d*) The most strongly emphasised grammatical exercise done in the Pre-University Class.

2. Lexical Item :

   Forms of Words.

3. (*a*) Book recommended : A Preparatory General English Course for College (Social sciences), C. I. E., Hydrabad.

   (*b*) Students should do written exercises selected by the teacher from the book recommended or any other books. The exercise books should be inspected regularly and used for determining sessional marks.

   (*c*) Practical work in making of notes on printed and spoken material should be included.

   (*d*) Group discussions on topics dealt with in the extensive reading text should form part of the class work. This may occasionally be done through a formal debate.

   (*e*) Students should be helped to read efficiently and independently.

4. Examinations :

   It will include questions of the following types :

   (i) Multi-choice or other questions to test sentence patterns, vocabulary and usage (30 marks).

   (ii) Comprehension questions on "passage relating to Economics" (10 marks).

   (iii) Making notes of such a passage (5 marks).

(iv) Making a precis of a passage (15 marks).

(v) Writing a paragraph each on 4 topics of about 20 lines. The topics will be taken from the extensive reading texts (20 marks).

(vi) Writing of an essay based on given notes or outlines. This will relate to a topic of current interest in Economics (20 marks).

5. The following are the texts prescribed :

Extensive Reading Texts	Name of the book
1. India's Dynamic Capacity (Pages 475-481)	Discovery of India —Jawaharlal Nehru
2. Inequality (Ch. VII)	Affluent Society —J. Galbraith
3. Welfare State—The Modern Delusion (Pages 181-192)	Prosperity through Competition —Erhard
4. Economic Possibilities for our grandchildren (Pages 358-374)	Essays in Persuasion —K. M. Keynes
5. Evil Trinity (Pages 21-49)	Economics for Democrates —G. Crowther
6. The Economist in the 20th Century	The Economists in the 20th Century —L. Robbins
7. Chapter : Italian Miracle	Economic Miracles.

B.A. ECONOMICS (Special)

PART III

Economic Theory :

1. The nature and scope of Economic Theory—Analytical Principles—The relationship between empirical studies and Economic Analysis—The use of Mathematics in Economic Analysis—The usefulness of Economic Analysis.

2. Demand and supply—Market : price, demand elasticity of demand, supply, equilibrium.

3. Indifference Curve Analysis—The indifference schedule—Principle of Diminishing Marginal rates of Substitution—The income effect—The pattern of Indifference Curves—Income effect versus substitution effect—Substitutability and the nature of indifference Curves.

4. The Equilibrium of the Firm—Profit maximisation. Marginal revenue—marginal cost—The average cost curves. Short run and Long run average cost curves.

Pure Competition :

Definition—Normal profit—Equilibrium of the firm and industry in the short run—Out-put and price in the Short run—Long run equilibrium of the firm and industry. Out-put and price in the Long run—Supply schedules in the Short run and Long run—The Cobweb Theorem.

Monopoly :

Assumptions—Price and output of an unregulated Monopolist—Determination of price and output at a given point of time—Price discrimination—Profitability of discrimination—restraints upon monopoly—regulated monopolies.

Monopolistic Competition :

The nature of demand schedules for the product of the firm—Long run price and output adjustments—Advertising—Entry restrictions—Industry cost conditions.

Oligopoly :

Price leadership.

Marginal Productivity :

Factor prices and distribution of income—Marginal revenue products. Wages Collective bargaining—Supply curve of labour.

Interest :

Necessity for paying interest—demand and supply of loanable funds—Money and Interest—Choice between savings and consumption—The interest rate level.

Rent :

Economic rent—Land—Marginal productivity analysis—Differences in fertility and location—Non-agricultural production—Quasi rent—Profits—The entrepreneur Risk and Uncertainty—Ownership and Control—Marginal profits and productivity—Profits as a functional return—Role of profits in the economy.

General Equilibrium of the Economy :

General equilibrium and employment—Say's Law—Wages and unemployment.

National Income :

Concept of National Income—Product approach—Calculation—Income approach—Calculation—Income—Disposable Income—The equilibrium level of National Income.

Books Recommended :

Stonier, A.W. and Hague, D.C.	:	A Text-Book of Economic Theory (Latest Edition)
Due, J.F.	:	Intermediate Economic Analysis (Latest Edition)
Fellner	:	Introduction to Economic Analysis
Meade:	:	Stationary Economy.
Nevin, E.T.	:	Text-Book of Economic Analysis

Indian Economic Problems

Emphasis as far as possible on current rather than historical aspects. Also to be critical rather than descriptive.

1. *Population :*

Growth of population—Impact on economic development—The population problem—Population policy.

2. *Agriculture :*

Productivity trends since 1951—Quasi—stagnation in agricultural production : diagnosis and basic remedy—Land reforms—Co-operative farming—Problem of land ceilings—Co-operative marketing—The food problem—Food policy—Rural finance—Service Co-operatives.

3. *Cottage and Small Scale Industries :*

Thier place in Indian economy—Measures for promotion.

4. *Large Scale Industries :*

Recent growth, present position and major problem of the Cotton Mill Industry, the Iron and Steel Industry, the Sugar Industry.

5. *Industrial Problems :*

The problem of industrial finance—Institutions catering to long term financial heeds of industries—Role of foreign capital—Industrial policy.

6. *Industrial Labour :*

The Trade Union Movement — Industrial disputes — Social security.

7. *Transport :*

Transport development under planning—Transport co-ordination.

8. *National Income :*

Growth since 1950-51—Constituent elements.

9. *Currency Prices and Foreign Exchange :*

Present currency system—Inflation—Devaluation of June 1966 — India and the I.M.F.

10. *Banking :*

Main features of the money market—Reserve Bank and credit control—Reserve Bank and the money market—Nationalisation of commercial bank.

11. *Foreign Trade :*

Composition and direction since Independence—Balance of payments problem—Export promotion—Tariff policy.

12. *Public Finance :*

Public expenditure since Independence—Financial relations between Union and States—Recent trends in Central revenues.

13. *Planning :*

Aims, objectives, priorities and appraisal of the achievements of the Five Year Plans—Planning and unemployment—Mixed economy —Problems of the Public and Private Sectors.

Books Recommended :

1.	Das & Chatterji	:	Indian Economy—Its growth and problems
2.	Wadia & Merchant	:	Our Economic Problem
3.	R. Balakrishna	:	Studies in Indian Economic Problems
4.	R. Balakrishna	:	Review of Economic Growth in India
5.	J. P. Lewis	:	Quiet Crisis in India
6.	D. K. Malhotra	:	History and Problems of Indian Currency.
7.	T. A. Vaswani	:	Indian Banking System
8.	Narendra Kumar	:	Bank Nationalisation in India

Currency, Banking and International Trade

A. The functions and kinds of money. Monetary Standard, Monometalism, Bimetallism, Different types of Gold Standard—Paper Standard—Principles and systems of note issue—Value of money and its measurements—Index numbers. The Quantity Theory of Money—Cambridge—Equation—Savings and Investment. Theory of Keynes—Inflation—Deflation—Methods of stabilising the value of money—The Trade Cycle—Role of money under different economic systems. Monetary Policy.

Foreign Exchanges : The Gold points—Purchasing Power—Parity theory—Foreign Exchange Market—The Value of Currency Exchange controls—Objects—Indirect Controls—Intervention—Exchange Restriction, Exchange Clearing. The International Monetary Fund Special Drawing Rights.

B. Evolution of Modern Banking—the general structure and methods of Commercial banking Unit—Banking and Branch Banking—Assets and Liabilities of Commercial banks—Bank balance sheets—the creation of credit—The cheque system and the clearing House—Comparative banks—Savings Banks—Investment Banking—Mixed Banking. Regulation of Banking. The World Bank—The Asian Development Bank.

The Working of a Commercial Bank : Customers—Interest warrants—crossing—endorsements, lost cheques etc.—Different types of accounts—minors, joint accounts, company accounts, accounts of societies etc.

The Central Bank: Nature and functions—Types of Central Banks—Methods of Credit Control.

Banking System in different Countries: England—France—U.S.A. and the Federal Reserve System, Japan, Soviet Russia and India.

The Money Market: Main constituents Bills of Exchanges—Discount Houses and Acceptance Houses—Problems of Central Banking in undeveloped Money Markets—Stock Exchange and Industrial Banking International Finance Corporation.

C. Domestic trade and International trade—theory of comparative costs—The terms of trade—Balance of trade and balance of payments—Free trade Vs Protection—Regulation of International trade—tariffs quotas, exchange control—European common market—European payments union, General Agreements on Tariffs and Trade. United Nations Conference on Trade and Development.

Books Recommended:

1. An Outline of Money—G. Growther.
2. Modern Banking—Sayers.
3. Money—D. H. Robertson.
4. Indian Currency and Exchange—D. K. Malhotra.
5. Modern Banking in India—S. K. Muranjan.
6. International Trade—Whale.
7. Monetary Theory—G. N. Halm.

Public Finance

1. *Nature and scope of Public Finance:*

2. *Public Expenditure:*

Public Expenditure and Private Expenditure. Classification of Public Expenditure.

Effects of Public Expenditure on employment, production and distribution.

Public Expenditure in India—Central Expenditure—State Expenditure.

3. *Public Revenue :*

Classification of Public Revenue—Tax and Non-Tax Revenue—Revenue from Public Industries.

Definition of a Tax—Characteristics of a sound tax system—Adam Smith's cannons of taxation—Taxation and incentives. Proportional and Progressive rates of taxation—Taxable capacity. Kinds of taxes—Direct and Indirect taxes—Income Tax—Death duties—Gift Tax—Expenditure Tax—Wealth Tax—Customs duties—Excise duties—Sales Tax.

Effects of Taxation—Tax Evasion.

4. *Shifting and Incidence of Taxation :*

Shifting under competition and monopoly. Major, direct indirect tax—taxation in India.

5. *Public Debt :*

Forms of Public Debt—Repayment of public debts—Debt redemption—India's Public Debt.

6. *The Budget :*

What is a budget—Features of the Budget. Budgetary Policy.

7. *Federal Finance :*

Principles of Federal Finance—Financial relations between the centre and the states in India—The Finance Commissions.

8. *Local Finance :*

Local and National Taxation Compared.

Books Recommended :

1. H. Dalton—Public Finance.
2. U.K. Public Finance.
3. Taylor P.E.—Economics of Public Finance.
4. Audley & Sundharam—Public Economics.
5. V. G. Ramakrishna Aiyer—Outlines of Public Finance.
6. D. T. Lakdawala—Union State Financial Relations.

Economic Thought

Syllabus :

1.	Classical	—Adam Smith Ricardo Malthus J. S. Mill
2.	Socialist	—Marx
3.	Historical	
4.	Austrian	
5.	Neo-Classical	—Marshall Pigou
	Keynes	
6.	Post Ceynesian	

Books Recommended :

Title of Book		*Author*
History of Economic Thought	..	L. H. Haney
History of Economic Thought	..	Roll, Eric
Development of Economic Doctrine	..	A. Gray
History of Economic Doctrines	..	Heimann
History of Economic Doctrines	..	Gide and Rist
History of Economic Thought	..	O. H. Taylor
History of Economic Thought	..	K. W. Kapp & L. L. Kapp

I

Classical School

(1) Adam Smith : Introduction—" The Wealth of Nations "—Importance of Labour—the division of labour—Theory of value—Laissez Faire—International Trade.

(2) David Ricordo	:	Value — Distribution — ideas on surplus—Money, Foreign trade.
(3) T. R. Malthus	:	Malthus Theory on population.
(4) J. S. Mill	:	International Trade—Mill on the "Social question"—The unearned Increment—Laissez Faire.

II

Socialist

(1) Karl Marx	:	Labour theory of Value—Surplus theory of value.

III

Historical School

Major ideas of the Historical School.

IV

The Austrian School

The Austrians and their value theory — Distribution — Marginal utility—Critical estimate.

V

Neo-Classical

(1) Alfred Marshall	:	Consumption—Consumer's Surplus—Theory of Value—Demand and supply (Equilibriam analysis) Time element — Representative Firm—Quasi.
(2) Prof. A. C. Pigou	:	Welfare economics—Theory of Employment.

VI

(3) J. M. Keynes	:	Under employment Equilibrium Theory of Employment—Multiplier — Theory of a Monetary Economy.

Economic Development and Planning

(a) Economic Growth

Syllabus :

1. Meaning of economic growth—Developed and under-developed countries.

2. Conditions of Economic Growth.

3. Importance of natural resources—Fertility of land, mineral and fuel resources—forests, water resources climate.

4. Population and Labour resources—Population problem in under-developed countries—The quality of labour—Habit, attitudes, social and institutional factors affecting economic growth.

5. Savings and Capital formation—Low rate of savings in low income countries—Actual and potential savings. Dissipation of savings—The problem of generating and mobilising savings. Meaning of Capital formation in the poorer countries—The capital output ratio—Measures to step up the rate of Capital formation. Capital formation and economic growth.

6. Foreign capital in economic development. Utilisation of foreign capital—The problem of repayment.

7. Problems of economic development—Inflation—Balance of payments difficulties.

8. Economic growth and welfare.

Books Recommended :

Title of Book	*Author*
Economic Development	.. C. P. Kindleberger
Economics of Development and Planning	.. M. L. Jhingar
Theory and Practice of Economic Planning	.. M. L. Seth.
An Introduction to Development Planning	.. W. A. Lewis

(b) Economic Planning

Syllabus :

(a) Meaning and objectives of economic planning—Utilisation of resources—Full employment—Avoiding wastes of competition—Reducing inequalities in income and wealth Raising of standards living.

(b) Planning for economic stability and Planning for economic development. Need for planning in under developed countries.

(c) The Technique of Planning—Setting of targets—Mobilisation and allocation of resources — Administrative machinery for planning.

(d) Types of planning—planning under Capitalism and Socialism —Short and Long term planning—Perspective planning Financial and Physical planning. National and regional planning—Freedom under planning.

(e) Planning for agricultural development—Role of agriculture in development—Estimation of demand for agricultural products—Estimates of inputs and their allocation Measures to increase production.

(*f*) Planning for the development of industries—Importance of industrialisation—Balance between agricultural and industrial development. The question of priority as between different types of industries. Choice of techniques—Labour intensive and capital intensive methods.

Books Recommended :

Title of book		*Author*
Economic Development	..	C. P. Kindleberber
Economics of Development and Planning	..	M. L. Jhingar
Theory and Piactice of Economic Planning	..	M. L. Seth
An Introduction to Development Planning	..	W. A. Lewis

Economic Statistics

1. Introduction : Meaning and definition of Statistics—Main divisions—Its relationship with other science with special reference to Economics—objectivility, functions and limitations.

2. Planning and organising a Statistical Enquiry Matters to be considered at the planning stage and Execution stage—Methods of collection of data—Editing of data—Accuracy, approximation and Errors.

3. Representation of data : Classification, seriation and tabulation—Diagramatic and graphic representation—Ratios, rates and percentages.

4. Measures of central tendency and Dispersion : Arithmetic mean, Geometric mean and Harmonic mean—Median and Mode. Range, mean Deviation, quartile deviation, standard deviation, skewness, Kurtosis, moments and coefficient of variation.

5. Time series : Components of time series and their measurement—Its application in Business and Econoimcs—Interpolation and Extrapolation.

6. Correlation and Regression : Methods of measuring correlation—Coefficient of correlation Regression equations, lines, coefficient and correlation. Regression equations, lines, coefficients and Galtons graph—Their interpretations—coefficient of association of attributes.

7. Probability : Definition—its calculation and theorems—Theoretical distribution—Binomial and normal distribution.

8. Sampling : Meaning and uses—Different methods of sampling—Sampling of attributes and va.iables—Statistical quality control—National Sample Survey.

9. Index Numbers : Meaning, uses and limitations—cost of living Index—Methods of construction—Fixed base and chain base—Tests of consistency—shifting, deflating and splicing.

10. Indian Statistics : Importance and limitations. Critical study of Population Statistics—Agricultural Statistics, Industrial Statistics and National Income Computation.

Books Recommended :

1. Fundamentals of Statistics .. D. N. Elhance
2. Statistical Methods .. S. P. Gupta
3. Statistics .. Taro Yamane

B. A. ECONOMICS (Special)

ANCILLARIES

(Syllabus)

Mathematics I

(i) Elements of set theory

(ii) Trignometry : Limits of $\frac{\sin x}{x}$, $\frac{\tan x}{x}$, as x tends to zero

Complex numbers : Argand diagram.

Dem Moivre's theorem and its simple application of elementary trignometrical series. Hyperbolic functions.

(iii) Vector algebra : Scalar and Vector products of vactors, triple products.

(iv) Analytical Geometry : Pair of straight lines. Circles including families of circles. Parabola, ellipse and hyperbola in canonical forms. Polar equations.

(v) Algebra : Finite and infinite decimals—Basic operations and properties, sequences of points ; monotone sequences. Mathematical induction. Inequalities. Solution of system linear equations, Determinants ; relations between roots and co-efficients of an algebraic equation ; Cubic equations ; approximate solutions ; Binomial theorem and exponential theorem (without proofs) for rational index. Binomial, exponential and logarithmic sereis Summation of series based on above.

Ratio test and Root test, for positive term series—Liebitz test for alternating series.

(vi) Matrices : Algebra of matrices. Rank of a matrix and its invariance by row and column operations—Linear equations in matrix notation.

Mathematics II

2. *Differential Calculus :*

Limits and continuity of functions. Definition of differential co-efficient. Differentiation of a function of a single variable successive

differentiation. Liebnit rule. Partial differentiation Tangents, normals, Curvature notion od asymptotes. Teaching of standard curves. Maxima and Minima. Mean value theorem ; Taylor's Maclaurin's expansions of functions as power series (in one variable).

2. *Integral Calculus :*

Integration as inverse of differentiation, Integration of rational functions. Integration by formulae of reduction. Determination of lengths of plane curves and areas bounded by them. Volumes and surfaces of revolutions.

3. *Differential exuations :*

Differential equations of first order. Linear equations with constant Co-efficients. Linear homogeneous equations.

Mathematics Paper I & II for
B.A. Special Economics

Books Recommended :

1.	S. L. Loney	..	Trignometry
2.	Shanti Narayanan	..	Vector Algebra
3.	Manickavachagam Pillai	..	Analytical Geometry
4.	Smith	..	Algebra
5.	Suryanarayanan	..	Algebra
6.	A. C. Aitken	..	Determinants and Matrices
7.	Manickavachagam Pillai	..	Calculus
8.	Taro Yamare	..	Mathematics for Economists

[illegible] differentiation. [illegible] partial differentiation [illegible] of [illegible] tials, Theorems [illegible] and [illegible]. Rolle's mean value theorem, Maxima and Minima. Maclaurin's theorem; Taylor's Maclaurin's expansions of functions as power series in one variable.

2. Integral Calculus:

Integration as inverse of differentiation, Integration of rational functions. Integration by parts and reduction, Determination of length of plane curves and areas bounded by them. Volumes and surfaces of revolution.

3. Differential Equations:

Differential equations of first order. Linear equations with constant coefficients. Euler homogeneous equations.

Mathematics Paper I & II for
B.A. (Special) Economics

Books Recommended:

1. S. L. Loney — Trigonometry
2. Shanti Narayan — Vector Algebra
3. Mathematics [illegible] — Analytical Geometry
4. Smith — Algebra
5. Shanti Narayan — Algebra
6. A. C. Aitken — Determinants and Matrices
7. Mukherjee [illegible] — Calculus
8. Hari Narain — Mathematics for Economists

CHAPTER XLVI

DEGREE OF BACHELOR OF SCIENCE (SPECIAL)

(B.Sc. Special)

Regulations

(THREE YEAR DEGREE EXAMINATION)

Conditions for Admission

1. Candidates for admission to the Degree of Bachelor of Science (Special) shall be required to have passed the Pre-University examination with Mathematics, Physics, Chemistry or Physics, Chemistry, Biology under Part III of this university or an examination accepted by the Syndicate as equivalent thereto and to have subsequently undergone the prescribed course of study in an affiliated college of this University for a period of not less than three academic years or nine terms.

Course of Study

2. The course of study shall comprise the following subjects according to the syllabus to be prescribed from time to time.

PART I

TAMIL OR ANY OTHER INDIAN LANGUAGE

The course is intended to enable the students to express scientific ideas and produce small essays and dissertations on scientific subjects through the regional language. No text-books will be prescribed. The dissertation and composition may be supervised by the Tamil Department with the help of the teachers in the main subject, and the topic of dissertation will be prescribed by the respective science department. The study will

extend over a period of one year and the candidate shall be examined at the end of the first year in one paper of three hours duration carrying maximum of 50 marks in written examination and 50 marks is allotted for internal assessment.

PART II—ENGLISH

The course shall comprise the study of certain books which will serve as a tool to express scientific ideas in simple English. The study will extend over a period of one year and the candidate shall be examined at the end of the first year, in one paper of 3 hours duration carrying a maximum of 100 marks for written examination and 60 marks is allotted for internal assessment.

PART III—OPTIONAL SUBJECTS

The optional subject shall consist of three groups, group A, group B and group C. Groups A and B shall consist of the ancillary subjects concerned with the main subject while group C shall comprise the study of the main subject.

The following shall be the optional subjects under Group C :

Branch	I :	Mathematics
Branch	III :	Physics
Branch	IV :	Chemistry
Branch	V :	Botany
Branch	VI :	Zoology.

The ancillaries in groups A and B under each branch shall be taken depending upon the main subject chosen.

The following will be ancillaries :

Branch I—Mathematics Main

There will be no ancillaries. Algebra, Geometry and Analysis will be taught in the I and II years of the

course and in the III year, five out of several possible subjects with application from mathematics as in appendix will be taught.

Branch III—Physics Main

There will be two ancillaries :—

(i) Mathematics

(ii) Chemistry (Syllabus given at the end).

Branch IV—Chemistry Main

(i) Physics shall be a compulsory ancillary subject and

(ii) second ancillary subject may be selected from the following :—

(1) Mathematics (Syllabus same as for ancillary Mathematics under Physics Main)

(2) Zoology (Syllabus given at the end)

(3) Botany (Syllabus given at the end)

(4) Geology (Syllabus given at the end)

NOTE : The selection of the second ancillary subject shall be made in consultation with the Head of the Department of Chemistry.

Branch V—Botany Main

The following shall be the ancillaries :

(i) Chemistry (Syllabus same as for ancillary Chemistry under Physics Main)

(ii) Zoology (Syllabus same as for ancillary Zoology under Chemistry Main)

Branch VI—Zoology Main

Chemistry shall be the compulsory ancillary subject and the other ancillary may be chosen connected with the main subject.

The major subject under group C shall be taught during the three year period and there shall be an examination at the end of each year according to the scheme of examination.

NOTE : The detailed syllabi for ancillaries are given at the end.

3. The scheme of examination shall be as follows :—

PART I—TAMIL

There shall be one paper of three hours duration carrying a maximum of 50 marks. The paper should contain questions on composition, dissertation and essays on scientific topics in Tamil. 50 marks is allotted for internal assessment.

PART II—ENGLISH

There shall be one paper of three hours duration carrying a maximum of 100 marks. 60 marks is allotted for internal assessment.

PART III—OPTIONAL SUBJECT

Branch I—Mathematics Main

			Maximum marks (including sessional)
I Year	Algebra I	— 3 hrs.	150 = (105 + 45)
	Geometry I	— 3 ,,	150 = ,, ,,
	Analysis I	— 3 ,,	150 = ,, ,,

II Year	Algebra II	— 3 hrs.	150 = (105 + 45)	
	Geometry II	— 3 ,,	150 = ,, ,,	
	Analysis II	— 3 ,,	150 = ,, ,,	

III Year 5 out of the following units—Mathematical Physics subject being considered as a double unit (2 units).

1.	Applied analysis	— 3 hrs.	120 = (84 + 36)
2, 3.	Mathematical Physics I	— 3 hrs. = 84	+ 72 (sessional)
	Mathematical Physics II	— 3 hrs. = 84	
		Total 240	= 168 + 72

Assessment for practical will be included in sessional marks to the extent of 50% of the sessional marks.

4.	Mechanics	— 3 hrs.	120 = (84 + 36)
5.	Astronomy	— 3 ,,	120 = ,, ,,
6.	Numerical Analysis	— 3 ,,	120 = ,, ,,
7.	Statistics	— 3 ,,	120 = ,, ,,
8.	Mathematical Economics	— 3 ,,	120 = ,, ,,
9.	Linear programming	— 3 ,,	120 = ,, ,,
10.	Automata theory and computor programming	— 3 ,,	120 = ,, ,,
		Total	1500

B.Sc. (Special) Physics

Scheme of Examination and Marks

	hrs.	Univ. Exam. marks	Internal	Total
I Year : *Major—A*				
1. Mechanics, Properties of Matter, Sound and Heat	3	60	20	80
2. Optics, Electricity and Magnetism	3	60	20	80
Practicals : One Session per week ; but no University Examination.				
Ancillary—I: Maths. Begin in the First Year, but no examination. First language and English completed in I year).				
II Year : Major-B.				
3. Electricity and Magnetism	3	60	20	80
4. Mathematical Physics and Advanced Mechanics	3	60	20	80
5. Optics	3	60	20	80
Practicals :				
2 Sessions per week Examination on courses 1, 2, 3 and 5	3 3	80 80		80 80
Ancillary I :				
Maths (Completed)	3 3	125 125		250

	hrs.	Univ. Exam. marks	Internal	Total
III Year : Major-C.				
6. Thermodynamics and Statistical Mechanics	3	60	20	80
7. Electronics	3	60	20	80
8. Atomic and Nuclear Physics	3	60	20	80
9. Quantum Mechanics and Special Relativity	3	60	20	80
Practicals :				
2 Sessions/week Examination on 7, 8	3	80		80
Record note books for entire course		40		40
Ancillary-II Chemistry				

At the end of the first year.

No university examination but sessional marks will be counted as follows :—

Sessional :—	Hours	Marks
Examination	—	10
Record Books	—	5
	Total	15

At the end of the Third year

	Hours	Marks
Ancillary II—Chemistry		
Paper I : Inorganic and Physical	3	90
Paper II : Organic	2	60
Practicals	3	50
Sessional : Examination		30
Record		5
Total		235

Chemistry Major

At the end of the First year.

	Hours	Marks
General Chemistry (Inorganic I, Organic I and Physical I combined)	3	140
Sessional (Theory)		45
(Practical)		15
Total		200

	Marks
Ancillary I : Physics	
Sessional : Examination	10
Records	5
Ancillary II:	
(*a*) If Mathematics	15
(*b*) If any science subject	10 + 5

At the end of the Second year

Chemistry :	Hours	Marks
Inorganic II	2	50
Organic II	2	50
Physical II	2	50
Practical (Inorganic qualitative)	6	40
Sessional : Written papers		45
Practical (Lab. Work)		15
Practical (Records)		10
	Total	260

Ancillary I : Physics		
(Theory) Paper I	3	75
Paper II	3	75
Practical	3	50
Sessional : examination		30
Records		5

Ancillary II :

If Mathematics :

Paper I : Written	3	100
Paper II : Written	3	100
Sessional		35

If any science subject :

Paper I : Written	2	75
Paper II : Written	2	75

			Hours	Marks
	Practicals		3	50
	Sessional : Written examination			30
	Record Books			5

At the end of the Third year

			Hours	Marks
Written :	Inorganic	III	3	70
	Organic	III	3	70
	Physical	III	3	70
Sessional :	(Written)			
	Inorganic		—	30
	Organic		—	30
	Physical		—	30
Practicals :				
	Inorganic (Quantitative)		6	60
	Organic		6	60
	Physical		6	40
Practicals :	(Sessional)			
	Inorganic :	Lab. Work	—	25
		Record	—	5
	Organic :	Lab. Work	—	25
		Record	—	5
	Physical :	Lab. Work	—	15
		Record	—	5
			Total	540

ANCILLARY : CHEMISTRY :

(Zoology major)

At the end of the First year

No university examination but sessional marks will be counted as follows :

	Hours	Marks
Examinations	—	10
Record Books	—	5
	Total	15

At the end of the Second year

			Hours	Marks
Paper I	:	Inorganic and Physical	3	90
Paper II	:	Organic	2	60
		Practicals	3	50
Sessional	:	Examination		30
		Record		5

Branch V—Botany Main

Scheme of Examination

At the end of the First year :

	Hours	University Marks	Sessional Marks
Theory Paper I			
Morphology, Taxonomy Economic Botany	3	100	

	Hours	University Marks	Sessional Marks
Practical I			
Morphology, Taxonomy Economic Botany	3	50	
Records		10	
Sessional : Theory I			40
Records			10
Total		160	50

At the end of Second year :

	Hours	University Marks	Sessional Marks
Theory II			
Thallophytes, Bryophytes, General microbiology and Plant Pathology	3	100	
Theory III			
Anatomy, Pteridophytes, Gymnosperms	3	100	
Practical II			
Thallophytes, Bryophytes, General microbiology and Plant Pathology	3	50	
Practical III			
Anatomy, Pteridophytes, Gymnosperms	3	50	
Records		20	
Sessional : Theory II			40
Theory III			40
Records			20
Total		320	100

	Hours	University Marks	Sessional Marks
At the end of Third year :			
Theory IV			
Cytology, Physiology Embryology	3	100	
Theory V			
Ecology, Genetics, Evolution and Plant-breeding	3	100	
Practical IV			
Cytology, Physiology, Ecology, Genetics and Microtechnique	3	50	
Slides		10	
Records		10	
Sessional : Theory IV			40
Theory V			40
Records			10
Slides			10
Total		270	100

B.Sc. Botany (Special)

(Ancillary Subjects—Distribution of Marks)

First Year :	Hrs.	University Marks	Sessional Marks
Ancillary I (Chemistry)			
Sessional :			
Theory			10
Records			5

	Hrs.	University Marks	Sessional Marks
Ancillary II (Zoology)			
Sessional :			
Theory			10
Records			5
		Total	30

Second Year :

	Hrs.	University Marks	Sessional Marks
Ancillary I (Chemistry)			
University			
Theory I	3	75	
Theory II	2	75	
Practical	3	50	
Sessional :			
Theory			30
Records			5
Ancillary II (Zoology)			
University :			
Theory I		75	
Theory II		75	
Practical		50	
Sessional :			
Theory			30
Records			5
	Total	400	70

Ancillary Botany

(for Zoology and other major specials)

At the end of the first year :

There is no University Examination, but sessional marks will be given :—

	Hrs.	University Marks	Sessional Marks
Sessional :			
Theory		Nil	10
Records		Nil	5
Total			15

At the end of Second Year :

	Hrs.	University Marks	Sessional Marks
Theory I (Thallophytes, Bryophytes, Pteridophytes, Gymnosperms and Histology.)	2	75	
Theory II (Morphology and Taxonomy of Angiosperms, Plant Physiology and general principles.)	2 ...	75	
Practical	3	40	
Records		10	
Sessional :			
Written			30
Records			5
		200	35

	University	Sessional	Total
Theory	150	40	190
Practical	50	10	60
	200	50	250

Branch VI—Zoology Main

Scheme of Examination

At the end of First year :

	Hrs.	University Marks	Sessional Marks	Total
Theory Paper I				
Invertebrata	3	100		
Theory Paper II				
Chordata	3	100		
Practical I				
Dissection Etc.	3	50		
Specimens and Record		30		
Sessional :				
Theory Paper I			40	
Theory Paper II			40	
Record			10	
		280	90	370

	Hrs.	University Marks	Sessional Marks	Total
At the end of the Second year				
Theory Paper III				
Biochemistry, Biophysics Cytology and Histology	3	100		
Ancillary (Theory)				
Practical II				
Biochemistry, Cytology and Histology	3	40		
Record and prepared slides		30		
Sessional :				
Theory Paper III			40	
Practical Paper II			10	
		170	50	220
At the end of the Third year :				
Theory Paper IV				
Physiology and Ecology	3	100		
Theory Paper V				
Embryology Genetics and Evolution	3	100		

	Hrs.	University Marks	Sessional Marks	Total
Ancillary (Theory)				
Practical Paper III				
Physiology and Ecology	3	50		
Practical Paper IV				
Embryology, Genetics and Evolution	3	50		
Records and Specimens		20		
Sessional :				
Theory Paper IV			40	
Theory Paper V			40	
Records and Specimen			10	
		320	90	410

4. No candidate shall be eligible for the degree of Bachelor of Science (Special) unless he/she has completed the course of study prescribed and passed the examination in the several subjects contained in the course of study as detailed in the regulations.

5. A candidate shall not be declared eligible for the degree of Bachelor of Science (Special) unless he/she has passed the examination in English under Part II, in the language under Part I and in the selected optional groups under Part III.

6. A candidate for the Degree of Bachelor of Science (Special) shall be declared to have

Marks for a pass passed—

(i) Part I of the examination : if he/she obtains not less than 35% of the marks in Part I. (both written and sessional put together).

(ii) Part II of the examination: if he/she obtains not less than 35 % of the marks in Part II, separately, in written and sessional ;

(iii) Part III of the examination : if he/she obtains a separate minimum of 35% in each subject for theory and sessional put together. (Except in Mathematics main).

(iv) A candidate shall be declared to have passed the Part III of the B.Sc. (Special) Mathematics degree examination, if he/she obtains not less than 35% of the marks in each paper separately in written and sessional.

7. Candidates who obtain 60 percent or above of the marks in any one of the Parts I, II and III shall be placed in the first class in that part.

Classification of Successful Candidates

Successful candidates who obtain less than 60 percent but not less than 50 percent of the marks in any of the parts I, II and III shall be placed in the second class.

All other successful candidates in Parts I, II and III shall be placed in third class. A candidate securing not less than 75 percent of the marks in any of the I, II or III Part of the examination shall be declared to have passed with distinction.

Mark Statement 8. Marks Statement shall be furnished.

It will be open for a candidate during his course of study in the B.Sc. (Special) degree course to offer an additional ancillary provided he/she undergoes instruction in the subject in the college. Such candidate can appear for the ancillary any time after the second year of the three year degree course.

DETAILED SYLLABUS

PART I—(TAMIL OR ANY OTHER INDIAN LANGUAGE)

Tamil

Three hours of instruction per week will be allotted for the study of the languages.

Three periods per week may be allotted to the teaching of Tamil for the B.Sc. (Special) course for the first year (1) for producing effective translation of scientific passages by the students (2) for making the students write articles in simple and precise Tamil and (3) for making the students review scientific books and articles and that one period for each division be allotted.

The following books for reference are recommended. More books of reference to be included are left to the discretion of the college staff.

1. Nam Unarchi Uruppukal
2. Uyirottam
3. Kattrup Perungkadal
4. Sakkarangal Sulalvathen ?
5. Vaan Veli
6. Astraolo Aatral
7. Mannilum Vinnilum
8. Namum Vignanikalovam
9. Electron
10. Seyalpadum Ulakam
11. Vignana Vilakkam (Part I)
12. Vignana Vilakkam (Part II)

PART II—**English**

1. *Introduction :*

The following syllabus is designed to provide a one-year course in English for above average science under-graduates.

2. *Aims :*

(1) To assist the student in acquiring English as an effective means of communication of scientific knowledge.

(2) To assist the student in readily undertaking spoken discourse as well as English written on scientific themes.

(3) To assist the student to express the scientific information clearly and precisely, using written and spoken English.

3. *Syllabus Outline :*

The syllabus will include the following.

(1) A course in the technique of reading passages of a scientific bearing by recognised authors.

(2) A course in the technique of making notes.

(3) A course in the Presentation of Technical Information (P.T.I.) in both speech and writing.

4. *Grammatical Items :*

The following items which have a high frequency in scientific literature, should receive special practice.

(1) Passive voice, with and without agent,

Examples : Energy will be given out.
The wiring is protected by a separate fuse.

(2) Passive infinitive.

Example : Switches to be pulled open by an electro-magnet.

(3) Infinitive expressing purpose.

Examples : To start the action, we have to supply heat.
He employed the technique to remake people's faces.

(4) Simple present tense for universal statements.
Example : Radiation harms the tissues.

(5) The - -ing form (gerund)

Example : Radiation can harm without causing pain.

(6) Modifiers, pre-head.
Example : A complete conducting path.

(7) Qualifiers, post-head.
Examples : Circuit breakers for large currents. Current of the sizes supplied to houses.

(8) The uses of the articles, including zero articles.
Examples : Electricity is generated.
The electricity generated.
An electric generator. . . .

(9) Noun clauses after " that ".
Examples : He discovered that the dead frog could be made to move.

(10) Clauses and phrases introduced by how, when, where, etc.
Examples : When current passed through the wire, the compass needle moves.
He discovered how to do it.

(11) Impersonal constructions.
Examples : It is impossible to repeat the experiment.

(12) Comparison.
Examples : This method is easier than the others.
The higher one goes, the colder the air becomes.

(13) Uses of " As " " Since " and " For ".
Examples : As soon they began. . . .for minutes.
The process has been known since early times.

(14) " If " clauses.
Example : If the metal is heated, it melts.

(15) The models, especially must, may, can, should.

Example : It may cause skin burns.

(16) Introductory phrases and words.
Examples : Further more on the other hand. Owing to the general similarities between all metals.
While still an under-graduate, ...he.

Note : This list, while not intended to be exhaustive indicates structures which have a high frequency in scientific literature, and therefore need special teaching in a course of this nature.

Lexical Items :

(1) Prefixes, suffixes and word formation.

(2) Expansion of general and scientific vocabulary. A guide to the basis minimum vocabulary is the lists in " The Study of English in India " pp. 167-195.

6. Teaching methods.

(1) The syllabus will be taught through seminars. There should not be more than 40 students in a seminar. Work will be based on a student's course book.

Books recommended :

Thomby G. C.—Scientific Enlgish Practice—Longmans. For additional material the teacher is recommended to make use of :

A preparatory General English Course for Colleges (Physical Sciences, Central Institute of English, Hyderabad and Orient Longmans).

(2) Students should do written exercises from the above books in class similar exercises selected by the teacher may also be used for extra language practice. Student's exercise books should be inspected regularly and used towards determining sessional marks. (See " Examinations " below).

(3) Practical work in the marking of notes on printed and spoken material should be included.

(4) Instruction in extracting information from dictionaries, journals and standard reference books is necessary.

(5) Group discussions on topics suggested by the course books, as well as by the extensive reading text, should form a part of class room work. This may occasionally be done through a formal debate.

(7) The teacher should occasionally read a passage aloud as a model of oral presentation. Students should also read their own written work, and other passages, to an audience.

(8) Free writing of a technical nature should be based upon graphs, charts, tables and diagrams. Such writing should lead up to composition of several paragraphs in length.

(9) Extensive reading is very important. Students must be shown how to read efficiently and independently. There must be no attempt to lecture on the texts used for extensive reading although one lesson a week should be used for discussion with the students of their reading progress and problems. In general books about scientific pioneering and adventure and biographies of eminent scientists will be suitable reading material. At least the four books from the recommended list should be read during the year. The students notes on his own extensive reading should be considered when awarding sessional marks.

7. *Examinations :*

(1) There will be one 3 hour paper at the end of the year. It will carry **100** marks.

(2) 60 marks will also be awarded by college assessment. (See 6(2) and 6(9) above).

(3) Students must score at least 35% marks in each of the two of the examinations (7(1) and 7(2) above.)

(4) The written paper will test the student's competence in the kinds of English he has been studying. It will include questions of the following types :

(*a*) Multi-choice questions to test sentence patterns vocabulary and English usages.

(*b*) Comprehension questions on unseen passage of a scientific or technical nature.

(*c*) Making notes of unseen passage. These notes may be on a particular aspect of argument or line of argument from the passage. The student may then be required to write a precising these notes.

(*d*) Writing an account of the information provided by given data, such as rainfall, graphs or population tables, for example.

(*e*) Writing of an essay based on given notes or outlines. These will relate to topics dealt with in the extensive reading programme.

(5) Specimen questions of the above types will be provided for the guidance of lecturers and students.

8. *Bibliography :*

(1) Thornby G. C. —Scientific English Practice—Longmans.

(2) Preparatory General English Course for Colleges (Physical Sciences). C. I. E., Hyderabad and Orient Longmans.

(3) The Study of English in India. Ministry of Education, Govt. of India.

The followings are recommended to the lecturer :

(4) English language Teaching (3 times a year) Published by OUP in association with the British Council (Annual Subscription 12/6d).

(5) Close R.A.—English as a Foreign Language—Allen & Unwin.

(6) Quick R. and Smith A.H., (Editors) The Teaching of English—Secker & Warburg.

(7) Wood F.T.—Current English Usage—Macmillan (available in ELBS).

(8) Try Teaching Faster Reading (A Manual) Reading Faster (A Drill Book) O. U. P.

Text Books Suggested for B.Sc. (Special) English.

1. Selected short stories of to-day. (National Publishing Coy), Ed. Ramasamy—Rs. 2.

2. Famous Men of Science (Condensed by *C. N. Mangala*, P.T.I. Book Depot, Bangalore—Rs. 2.75.

3. Scenes from the Pickwick Papers (M. S. R. Senior Series, Macmillan).

4. Changing Horizons (Orient Longmans) G. C. Thornby—Rs. 2.50.

Syllabus for B.Sc. (Special) in Mathematics.

A I Year : (4 + 3 hours.)

Algebra I :

The Geometric line—finite and infinite decimals—Basic operations and properties. Sequences of points, Monotone Sequences, complex numbers and the Argand plane, induction and various applications : (including summation of Trigonometric Series) inequalities, congruences in integers and the classical results therein, Chinese remainder theorem, Fermat's Lagrange's Wilson's theorems ; Simple continued fractions and indeterminate (linear) equations ; solution of systems of linear equations, matrices, Determinants ; Relations between roots and coefficients, Location of roots of equations, cubic and biquadratic equations, Approximate solutions ; Probability.

Analysis I : (4 + 3 hours)

Sequences and limits ; series and convergence ; Functions of real and complex variables—bounded, monotone, bounded variation, continuous, regulated ; operations on functions step functions : polynomials ; power series ; Exponential, Trigonometric and logarithm functions, Differentiation and integration, indefinite integrals, Double Integrals, Triple integrals, integrals, Partial Differentiation Maxima-Minima Area. Volume : Ordinary, Differential Equations.

Geometry I : (4 + 3 hours)

Vector Algebra : Coordinate systems 2, 3 and dimensions Loci and Equations ; curve tracing, Standard properties of the first and second degree curves and surfaces (in standard forms).

B. II Year : (5 + 3 hours).

Real and complex number systems, General metric spaces : En. completion, continuity uniform continuity, uniform convergence : Representation of functions power series. Fourior series, Analytic Functions, conformal mappings, ' Cauchy's theorem and applications : Taylor and Laurent expansions. Periodic and doubly periodic mermophic functions.

Algebra II : (5 + 3 hours)

Sets and the Basic operations therein maps, countable sets : index sets. Relation, order, transfinite ordinals, transfinite induction, Equivalence relations ; Groups. Integral domains and polynomials, field and unique factorization domains, Matrices, Vector spaces, Bases, coordinate systems, linear transformations ; Bilinear forms, Reduction of Matrices, Unsolvability of the general quintic.

Geometry II : (5 + 3 hours) :

Euclidean transformations, projective transformations. Inverse transformations, Reciprocations, Applications.

Elements of Tensor Analysis—Elementary differential geometry of 3 spaces.

C. III Year :

5 units of applied Mathematics each of 5 hours (3+2) a week.

(The Candidate to offer any 5 Units of his choice.)

1. *Applied Analysis :* Partial differential equations : The General complete and simpler solution P.D.E. of the First order—Linear equations, non-linear P.D.E. Cauchy's method of characteristics, Charpit's method, Jacob's method P.D.E. of the second order : Linear P.D.E. with constant Coefficients characteristics, Linear hyperbolic equations, separation of variables, integral transforms, classification of second order P.D. Equations (Chapters 2 and 3 of I. N. Snedder : Elements of Partial differential equations).

Calculus of Variations : The variation of the line-integral. The Euler-Jacobi equations : applications (chapter 2 of Hildebrand Methods of Applied Mathematics).

Elements of Tensor-analysis : The idea of a differentiable manifold : Tensors and Elementary operations ; The curvature tensor and geodesics in a Riemanian space ; (Chapter 3 of Laugwitz, Differential and Riemanian geometry (A.P.). Also Hay, Vector and Tensor analysis (Dover).

Differential equations : Difference operators, homogeneous and non-homogeneous linear equations with constant coefficients. Approximation to Solution of differential equations, (Hildebrand : Methods of Applied Mathematics).

Special functions : Bessel, Hermite and Legendre function, the associated differential equations and recurrence relations.

2-3. *Mathematical physics :* (Double-unit).

Paper I. Thermodynamics, statistical mechanics, kinetic theory of gases ; Elements of Quantum Mechanics (Course covered by relevant chapters of the text by Margena and Murphy, Band and Joos).

Paper II. *Classical fields theory :* Special theory of relativity, Course covered by relevant chapters of the texts by Band, Joos, and Margena-Murphy provision should be made for experimental work.

(1) Thermal expansion of a rod using a spherometre and optic lever.

(2) Compound and Kater's pendulum for measuring acceleration due to gravity.

(3) Young's modulus, rigidity modulus, and Poisson's ratio by Searles method.

(4) Surface tension and contact angle of mercury on glass by Quincke's method.

(5) Viscosity of a liquid by Poiseulle's flow through a capillary tube.

(6) Coefficient of expansion of air at constant volume—Jolly's tube.

(7) Refractive index of a prism and i-d curve spectrometer.

(8) Laws of transverse vibration of a string sonometer.

(9) Vibration magnetometer-magnetic movement of a magnet and earth's magnetic field (Horizontal component).

(10) Electrical field along the axis of a coil carrying current-deflection magnetometer.

(11) Temperature coefficient of resistance using a bridge net work.

(12) Mechanical equivalent of heat-electrical of fraction cone apparatus.

(13) Measurement of the capacity of a condenser—using a ballistic Galvanometer.

(14) Interference of light—Fresnel's biprism.

(15) Diffraction of light by a straight edge and a wire.

(16) Diffraction grating with spectrometer.

4. *Mechanics :* Equilibrium of forces in a plane, in space-friction—Acceleration and expressions thereof in various co-ordinate systems — The equation of motion — Systems of particles — D'Alembert's principle—Equation of motion of a rigid body about a fixed axis or in a plane.

Generalised Coordinates and Hamilton's Equations.

Centre of pressure—Equation of continuity and state in Hydrodynamics.

5. *Astronomy :* Spherical trigonometry and coordinates in the sphere—The celestial share Time, planets and their motion—Aberration—Refraction—Parallax — Eclipses — Instruments — The Universe.

6. *Numerical :* Polynomial interpolation—Differential equation—Least squares and application—Harmonic analysis (Booth, relevant portions may be a suitable book).

7. *Statistics :* Probability—Randum variables and theoretical distribution—collection and tabulation of statistics and calculation of averages, coefficients of dispersion—Sampling and tests of significance—Analysis of variance ; Regression ; Mark off process.

8. *Mathematical Economics :* Simple models—micro and macro —Static and dynamic models of Harrod—Domer and Samuelson—Hics ; Production functions—Leontif's matrix—Supply and demand — Linear models—Structural educations—Identifiability and identification.

9. *Linear programming and Game Theory:* The minimax principle The theory of games—solutions of inequalities—Linear programming and applications—Queuing allocation and storage problems.

10. *Automata theory and computor programming :* Partially ordered sets and lattices. Boolean algebra and logic ; Binary number system, simplification of Boolean functions. The basic principles of the arithmetic operations in analog computer and digital computers. Use of and operational amplifier for arithmetical operational ; analog computer representation of second order linear differential equations with constant co-efficients.

Principles of digital computer programming :

Flow chart Programming language fixed and floating point, constants and variables ; order of arithmetic operations in a statement ; transfer of control statements—input, output instructions format ;

indexing do-loops ; dimensions statement ; preparation of Fortan Programme for the solution of simple problems upto 3 × 3 matrix multiplication and solution of a cubic equation.

Machines : Definition and equivalence realisation state assignment problems, " Don't are conditions ". Partitions and the substitution property ; Partition Pairs and pair algebra ; Loop-free structure of Machines State-splitting feed back and errors, semi-groups and machines.

Textbooks Recommended Indicating the Scope of the Syllabus.

Algebra	Bernand and Child Birkhoff and Maclane.	Higher Algebra A Survey of Modern Algebra (Macmillan)
Goemetry	Boyd and Downing and Parkhamenkov Graustein	Analytic geometry, Geometric Transformations (Vols. I and II) (Macmillan) Higher Geometry (Dover).
Analysis	Gibson	Elementary treatise on Calculus.
	Courant and John Knopp	Differential and integral Calculus, Theory of functions 1 & 2 (Dover).
Applied Analysis	Courant and Hilbert.	Methods of mathematical physics (relevant Chapters) (Interscience)
	Laaguitz	Differential and Riemanian Geometry (Academy Press).
Statistics	Keeping	Introduction to Statistical inference (Van Nostrand)
	Tucker Mood	An introduction to probability and mathematical statistics, (Academic Press).
Linear programming	Glleksman	Introduction to Linear programming and the theory of games (Wiley)
	Reignfild and Vogal	Mathematical programming (Prentice-Hall).
Automata theory	Hartmains and Stearness	Algebraic structure theory of sequential machines, (Prentice-Hall) A primer of Fortren programming.

Numerical Analysis	Booth Scarborough	Numerical method, (Academic Press)
Mathematical Physics	Band, Murphy and Morgenau and Joos.	(Relevant Chapters).
	Murphy and Mayana	The Mathematics of physics and Chemistry.
Mathematical Economics	Bushah and Clower	Introduction to mathematical Economics (Irwin).
	Timberger and Bos.	Mathemetical modes of Economic growth (Mc-Graw-Hill).
	Beach	Economic models (Wiley).
	Allen	Mathematical Economics.
Mechanics	Rutherford	Classical Mechanics, (Oliver and Boyd)
	Goldstein	Classical Mechanics.

B.Sc. (Special) Course PHYSICS

(Syllabus)

I Year

Mathematics

Ancillary (1)

(6 hours per week)

Application of Binomial Theorem, Exponential and Logarithmic series Solutions of linear equations in two and three variables Determinants Elementary probability. Nowton's and Horner's method of approximation to the roots of an equation.

Calculus : Differentiation of x, Sinx, Cosx, Exp(x), Log x, Inverse function. Differentiation of sum, product, quotient and a simple function, Differential coefficient as a rate measurer. Successive differentiation. Simple examples on maxima and minima. Tangents normals and curvature of plane curves. Partial differentiation Notion of differentials, errors approximation.

Integration : Standard integrals, Integration by simple substitution and by parts. Applications to find length of arcs, areas, volumes, centroid. Moment of Inertia. Application of Fourier series.

Differential equations : First order including the following types : (1) variables separable, (2) homogeneous equations, (3) linear equations (4) Bernoulli's equations, Second order : Linear with constant co-efficients. Applications to damped oscillations and forced vibrations.

Vector Algebra : Vector, Vector and Scalar products : Scalar triple products, Vector triple products, Illustrations. Equations to line and plane in Vector notation.

Major—1.

PART I

Mechanics and Properties of Matter

Dynamics : Displacement, velocity and acceleration vectors. Particle in linear and angualr motion Projectiles, Newton's Laws of Motion. Conservation laws and their applications. Motion in a circle. Centripetal and centrifugal forces, Impact and collision phenomena, direct and oblique impact.

Simple Harmonic Motion : Equation of motion Superposition of two SHM. Lissajou's figures, Damped oscillations. Coupled and forced oscillations and resonance simple pendulum.

Rigid Bodies : Rotation of a rigid body about an axis. Moment of Inertia. Parallel and perpendicular aves theorem. Kinetic energy and angular momentum. Couple and torque. Compound Pendulum.

Gravitation : Law of gravitation. Circular orbits. Kepler's Laws. Newton's Laws of Gravitation from Kepler's Laws. Gravitational field and potential calculation for a spherical bell and a sphere. Experiments " G " Effects of altitude, latitude and rotation of the earth on " g ".

Elasticity : Hook's Law. Elastic Limit. Stress, strain and elastic moduli. Bending and torsion of simple bodies. Flat spring. Experiments for finding the elastic constants of solid.

Viscosity : Streamline and turbulent motion in liquids. Co-efficient of viscosity. Poiseuille flow. Variation of coefficient of viscosity with temperature and pressure.

Surface Tension : Surface Tension and surface energy. Forces on thin films and excess pressures in bubbles and drops. The phenomenon of capillary rise. Experiments for measuring S. T. and angles of contact. Quincke's drop.

Statics : Composition and resolution of coplanar forces. Conditions of equilibrium of coplanar forces. Friction.

Dimensional methods : Units and dimensions, conversion of units, dimensional methods in Physics.

PART II

Heat and Thermodynamics and Sound

Thermometry : Principle of thermometry. Gas resistance and thermoelectric thermometers.

Thermal Expansion : General behaviour of solids, liquids and gases, Regnault's method for absolute expansion of liquids. Anomalous expansion of water. Practical consequence.

Kinetic theory : Postulates, Pressure and mean free path concepts. The gas law, Continuity of states. Andrew's and Amagat's experiments. Van dar Waal's equation of state and critical constants.

Thermodynamics : The mechanical equivalent of heat and its determination. Isothermal and adiabatic changes. The two specific heats of a gas and their measurements, Determination of the ratio of specific heats by adiabatic expansion and acoustic methods. The first law of thermodynamics. Heat engines. The second law and the Kelvin scale. The concept of entropy.

Heat Transport : Conduction, convection, and radiation. Methods of measuring conductivity. Emissive and absorptive powers. Newton's law of cooling. Stefan's Law cf optical pyrometers and the solar constant.

Sound : Expressions for plane progressive and stationary waves and the characteristic of such wave Beats Velocity of sound in solid liquid and gaseous media. Doppler Effect. Laws of vibration of stretched strings. Reverberation and acoustics of buildings.

Major—II (5 hours per week)

PART I

Geometrical and Physical Optics

Illumination : Intensity of illumination and luminuous flux. Photometry.

Refraction : Snell's law. Refraction through a slab. Total internal reflection and critical angle. Refraction through a prism. Minimum deviation. Spectrometer Combination of thin prisms. Refraction through a lens. Relations between refractive index, radius of curvature and focal length. Combination of thin lenses in contact and with a separation. Defects in the image formed by lenses and correction.

Velocity of Light : Fizeau's Foucault's and Michelson's methods of measurement.

Elementary wave Theory : Huygen's wave theory. Reflection, refraction and total internal reflection on the wave theory.

Interference : Young's experiments. Fresnel and Lloyd arrangements : Path difference and fringe separation. Newton's rings.

Elementary Diffraction and Polarisation Phenomena : Rectilinear propagation on the wave theory. Transverse nature of light waves and polarisation Phenomenan.

Typical Optical Instruments : Telescope and Microscope ray tracing in these. Eye pieces, constant deviation spectrometer.

Typical Optical Phenomena : The rainbow, mirage, solar spectrum and Fraunhorer lines, scattering of light and colour in nature.

PART II

Electricity and Magnetism

Electrostatics : Electric charge, conductors and insulators, Coulomb's Law and its verification, unit charge electric field liens of force ; e.g. potential due to a point charge and uniformly charged sphere Gauss's Law—Statement and applications. Van de Graaf generator. Capacitance, parallel plate condenser ; combination at condensers ; Dielectric constants.

Current Electricity : Current and current density resistance, resistivity and conductivity, Ohm's Law, Kirchoff's Laws, calculation of currents in simple resistive net-works. Wheatstone's net-work The Potentiometer. Heatink effects of currents determination of 'J'.

Magnetostatics : Magnetic poles, magnetic field and potential due to small magnets. Potential energy of a small magnet in a magnetic field. Gauss's theorem. Deflection and vibration magnetometers.

Magnetic field of Electric current : Definition of 'B' Magnetic field due to an electric current. Ampere's Law Force on a current carrying conductor. Galvanometer, Shunts conversion of a galvanometer into an ammeter voltmeter, Field on the axis of a circular current. Tangent Galvanometer.

Electromagnetic Induction : Faraday's experiments and the Laws of E.M. Induction. Induction coil principles and the earth inductor.

Alternating current : A. C. & D. C. generators and motors.

Thermoelectricity : Thermoeletric effects, and their experimental demonstration. Peltier & Thomooson's coefficients.

Chemical Effects : Laws of electrolysis and verification, Arrhenius theory storage cells.
(Why not have this section (under the line) as follows).

Books. For Major I & II

1. Starling and Wood all—Physics
2. Harvey and White—College Physics
3. Sears & Zemansky—College Physics.
4. Yardly & Close—Electricity & Magnetism.

II YEAR

Ancillary I

Mathematics—II

(5 hours per week)

Analytical Geometry of Two Dimension : Standard equations in rectangular co-ordinates : straight line, circle, parabola ellipse, hyperbola Graph plotting : $y = \exp(x)$, $y = \exp(-x)$, $y = \log x$, $y = \exp(\quad x^2)$.

Analytical Geometry of Three Dimensions : Standard equations of line plane, sphere Tangent plane to the sphere. Quadrics and their normal and tangent planes. Transformation to principal axes.

Trigonometry : Solutions of simple trigonometrical equations of the type a cos o + b sin o + c Complex numbers. Argand diagram. De Moivre's theorem and immediate applications. Series for sin, cos in powers of o. Hyperbolic functions. Solutions of the equation x = a.

Ancillary II

Chemistry—I

(3 hours per week)

Same syllabus as for B.Sc. (General)

(Refer ancillary syllabus given separately at the end)

Major—III

(5 hours per week)

Electricity and Magnetism

Electrostatics : Coulomb's law. Gauss's law and applications. Electric potential energy. Calculation of E from V simple charge distributions. Field and potential of a dipole. Laplace's and Poisson's equations. Simple applications. The method of electric images. Electric, polorisation and electrostatics field and dielectric media. Calculation of capacitance for simple geometrics.

Electric Current : Kirchoff's law, loop currents and applications in circuit analysis.

Magnetic field of a steady current. Lorentz force on a moving charge in a static *e m* field torque on a current loop. Ampere's theorem circuital law, simple applications. Ballistic galvanometers, charged particle in crossed electricity and magnetic fields. Hall effect in metals..

E.M. Induction : Laws of induction. Flux linked with a current circuit : coefficients of induction calculation in simple cases L C R circuit. Growth and decay of currents differential equation with a steady *e.m.* Power in a.c. circuits transformers, a.c. bridges.

Magnetic Properties of Matter : Theories of dia paramagnetism Susceptibility measurement. Guoy method, qualitative features of ferromagnetism hysteresis, magnetic circuits.

E. M. Waves : Maxwell's equations, wave equation for e.m. fields. Concept of Poynting Vector.

Book : 1. Peck, E.M. Theory.

2. Kraus : Electromagnetism.

Major IV

(6 hours per week)

Mathematical Physics & Advanced Mechanics

Vectors : Vector algebra, Differentiation of vectors, aradient, divergence and curl. Gauss's and Stokes and Green's theorems, Cartesian Spherical polar and cylindrical coordinates and transformations. The differential operators in these coordinates not required. Applications from mechanics electromagnetic theory.

Complex Algebra : Complex numbers and their algebra elementary transcendental function of the complex variable, Convergence and divergence of Series. Argand diagram : Differentiation and the Cauchy Riemann relations.

Differential Equations : Second order with constant coefficients—Applications to damped and forced oscillation. Partial differential equations—their solutions in cartesian coordinates. Power series methods.

Matrices : Matrix algebra and determinants, diagonalisation and characteristic equations, eigen values ; multiplication ; linear equation.

Probability : Basic concepts ; law of large numbers ; moments, dispersion and skewness ; Binomial, normal and Possion distribution ; principle of least squares, curve fitting for linear and regression, Chisquare test and applications.

Advanced Mechanics : Motion in a resistive medium resistance proportional to first and second powers of velocity, concept of terminal velocity, Conservative forces—necessary and sufficient condition. Potential, gradient and curl of a force field.

Motion of a system of particles linear momentum. Energy and angular momentum principles, Reduced mass two body motion referred to centre of mass coordinates. Variable massrocket motion.

Principles of virtual work and D. Alembert's principles ; Generalised coordinates and forces, Lagrange equations simple applications viz. simple pendulum, Atwood's machine, harmonic oscillator.

(*Major V*)

(4 hours per week)

Optics. Interferometers—Michelson's

Diffraction : Fresnel and Fraunhofer diffraction single slit, double slit and circular aperture : Rayleigh criterion ; Plane diffraction. Zone plate, half period zones, Cornu's spiral.

Polarisation : Polarisation by reflection and Brewster's law ; double refraction ; optical propagation in uniaxial crystals ; circular and elliptic polarisation ; Fresnel—Arago laws for interference of polarised light ; optical rotation.

Elements of spectroscopy : Emission and absorption spectra. Fluorescence, Stokes and Anti-Stoke's lines ; classical theory of Zeeman and Farady effects. Stark, Kerr and Raman effects.

E.M. Theory of optics : Wave equation : reflection and refraction of plane waves ; Fresnel formulae ; total reflection.

Books :
1. Jenkins and White
2. Longhurst
3. Ditchburn
4. Valasek
5. Wood.

III Year

Ancillary (2) Chemistry—II (3 hours/wk). Same syllabus as for B.Sc., (General).

(Refer ancillary syllabus given separately at the end)

Major VI

(4 hours per week)

Thermodynamic & Statistical Mechanics

Thermodynamics : Reversible and irreversible process ; basic laws of thermodynamics ; absolute scale of temperature ; entropy isothermal and adiabatic process ; Maxwell's relations ; thermodynamic potentials and applications ; Clausius Clapeyron equations ; phase changes and triple point. Joule-Thompson effect : adiabatic demagnetisation principle magnetic temperature.

Kinetic Theory : Maxwellian distribution ; equipartion of energy ; Kinetic theory of transport phenomena ; conductivity; viscosity; diffusion ; theory of Brownian motion.

Statistical Mechanics : Elements of statistical mechanics entrop and probability distribution law, of Maxwell-Boltzman applications

Radiation theory : Thermal radiation of a black body ; Stefan Wien and Rayleigh Jeans laws ; Planck's hypothesis and solution of the radiation problem.

Specific Heat of Solids : Dulong-Petit's law ; Einstein and Debye theories of specific heats ; zero point energy.

Course based on relevant chapters from :

1. Sears : Thermodynamics.
2. Pippard : Elements of Classical thermodynamics.
3. Saha and Srivastava : Treatise on Heat.

Major VII

(4 hours per week)

Wireless and Electronics

Lumped Linear Circuits : Thevanin's theorem ; resonant circuits and ' Q ' factor : universal resonance curve ; couple circuits.

Electron Tubes : Thermionic emission and Richardson equation : space charge limited current in the diode ; triode and multiple electrode tubes ; gas tubes.

Power Supplies : Rectifiers filters and voltage stabilisation ; amplifiers : response to small signals ; power amplifier : positive and negative feed back principles.

Vacuum Tube Oscillators : Feed back oscillators Hartly and Codpitt's oscillators frequency stabilisation.

Modulation : Amplitude and frequency modulation principles, side bands detection.

Receiver Systems : Superheterodyne and super regenerative systems, performance characteristics.

Radiation : Simple arrays, propagation in ionosphere.

Elements of Transistor Physics and Circuits : Semiconductors ; electrons and holes ; Hall effect junction transistor characteristics ; tyrical transistor circuits.

Basic Electronic Instruments : Cathode ray oscillograph vacuum tube voltmeter and multimeters.

Course Based on :

1. Shiergold : Asia Edition
2. Terman : Radio Engineering Handbook
3. Millman and Seely :

Major VIII

(5 hours per week)

Atomic and Nuclear Physics

Electron Physics : Discharge of electricity through gases at low pressures ; Cathode rays mass charge and e.m. ; Millikan's experiment ; Photoelectric phenomenon—the Einstein equation.

Radioactivity and the Nuclear Atom : Radio activity laws of growth, decay and equilibrium ; elementary ideas of the energy spectrum of beta and gamma rays. Large angle scattering of alpha particles and Rutherford model ; nuclear charge and atomic number ; isotopes mass spectrography of Thomson, Aston and Bainbridge ; mass defects.

Automic Physics : Analysis of spectra, series and term relationships ; series spectra of hydrogen ; Bohr's theory of hydrogen atom Bohr-Sommerfeld model ; ionisation and resonance potentials ; their vector model of atom ; Alkali type of spectra ; Pauli exclusion principle ; Periodic table.

X-rays : Production of continuous and characteristic X-Rays. Bragg's work on diffraction of X-Rays ; Compton scattering ; change of wavelength ; Mosley's Laws.

Nuclear Physics : Properties of stable nuclei ; evidence for the neutron ; The position ; Induced radioactivity ; radioisotopes ; opptication elements of Shell model.

Liquid drop model of the nucleus ; Nuclear fission-chain reaction, nuclear reactors ; principles of nuclear fusion.

Detection and Production of Ionising Radiations: Ionisation detectors ; G.M. counter, cloud chamber and emulsion techniques, Particle accelerators basic principles of cyclotron ; betatron and the linear accelerator.

Courses Based on :

1. Harvey White : College Physics.
2. Riehtmeyer and Kernard.

Major IX

(4 hours per week)

Elements of Wave Mechanics and Special Relativity

PART I

Wave Nature of Matter : Davission and Germer and G. P. Thomson's experiments on electron diffraction. Calculation of wavelengths for non-relativistic particles.

The Wave Function : The meaning of wave function, expectation values ; probability current density and stationary states.

Wave Equation : The Schrodinger equation and its solution for simple one dimensional cases, simple barriers, the linear harmonic oscillator and its impotance in real physical problems.

Angular Momentum : The eigen values of L and L^2.

The Rigid Rotor : Its importance in molecular physics.

PART II

The Special Theory of Relativity

Newtonian ideas of mass, length and time ; Galilean transformation—their breakdown ; Michelson and Morley experiment ; Lorentz contraction ; Postulates of Special Theory of Relativity ; Lorentz transformation—time dilatation : relativistic addition of velocities ; variation of mass with velocity ; mass energy relation examples.

PART III

Cosmic rays and elementary particles

Texts :

1. David Park : —Introduction to the Quantum Theory.
2. Swars : Elementary particles.
3. Richtmeyer and Modern Physics (for cosmic Kennard rays).

Reference :

Horris & Loeb : Wave Mechanics.

Dicke & Written : Quantum Mechanics.

Harvey & White : Particles.

Physics Main (Special)

List of Experiments in Major Physics

I AND II YEARS

PROPERTIES OF MATTER

1. Double optic lever. Radius of curvature.
2. Uniform bending-Pin and Microscope.
3. Non--uniform bending.
4. Uniform or Non-uniform bending—Telescope and sclae.
5. Young's modules—Cantilever (Static)
6. Young's modules—Cantilever (Dynamic)
7. Compound pendulum.
8. Torsion pendulum.

9. Static torsion.
10. Surface tension—capillary rise.
11. Surface tension—Drop weight method & interfucial Tension.
12. Surface tension—Jaegar's method.
13. Viscosity—Capillary flow.
14. Viscosity—Searries Viscometer.
15. Viscosity—Stoke's method.
16. Viscosity—Comparison of Viscosities and Radii (Eveete).

HEAT

17. Specific heat of liquid—method of mixtures (Barton's correction).
18. Specific heat of liquid—Method of cooling.
19. Newton's law of cooling—emissivity and emissive power.
20. Conductivity—Lee's disc method.
21. Latent heat of steam.

SOUND

22. Sonometer.
23. Melde's string—both methods.
24. Kudt's tube.
25. Helmholtz resonator.

LIGHT

26. Liquid lens—Concave mirror and convex lens.
27. Spectrometer—by finding A and D.
28. Spectrometer —i—d curve.
29. ,, —i—i curve.
30. ,, of liquid.
31. ,, Dispersive power.
32. ,, Narrow angled prism.
33. ,, Grating (Normal incidence).
34. ,, Grating (Minimum Deviation).

35. Thin Lenses—in and out of contact.

36. Newton's Rings—and R.

37. Newton's Rings—Refractive index.

MAGNETISM

38. Deflection Magnetometer—Comparison of Moments Tan-A and Tan-B Positions.

39. Deflection Magnetometer—Tan-C Position—M and H.

40. Vibration Magnetometer.

41. Deflection Magnetometer—Field along the axis.

42. Mirror Magnetometer—Inverse Square Law.

ELECTRICITY

43. Cary Foster's Bridge—Temperature Coefficient.

44. Potentiometer—Specific resistance.

45. Potentiometer —Calibration of ammeter.

46. ,, —Calibration of Voltmeter (High and low Range)

47. ,, —K. of T. G. (Primary and Secondary).

48. Mirror Galvanometer—Figure of Merit.

49. Mirror Galvanometer—Theormo couple.

50. Potentiometer—Thermo couple.

Demonstration Experiments.

1. Flat spiral spring (n, q and T)

2. Fly wheel.

3. Kater's Pendulum.

4. Bifilar Pendulum.

5. Searle's experiments (n, q and T).

6. Surface tension—(Quincke's drop).

7. Viscosities Comparison (Oswald's).

8. Thermal Conductivity—Searle's method.

9. Fresnel's Biprism.

10. Polarimeter.

11. Post Office Box.

12. Conductivity—Kohlrausch Bridge.

13. Earth Inductor.

During the first year there may be one Practical class per week.

During the second year there may be two.

III Year

LIGHT

1. Lloyd's single mirror—Wave length.
2. Air Wedge—Thickness of wire.
3. Newton's rings—concave and convex lens.
4. Young's modulus of glass—Hperbolic fringes.
5. Hartman's Interpolation formula—solar Spectrum.
6. Cauchy's constants.
7. Rydberg's constant.

MAGNETISM

8. I—H curve
9. B—H curve.
10. Search coil—Pole strength of magnet.

ELECTRICITY

11. High resistance (Leakage)
12. Figure of merit of B. G.
13. B. G.—Constant Hibbert's standard and solenoid.
14. B. G.—Comparison of E. M. Fs and capacities.
15. B. G.—Absolute capacity of condenser.

16. B. G.—Internal resistance of cell.

17. B. G.—Specific resistance.

18. B. G.—Comparison of Mutual Inductances.

19. B. G.—Determination of Mutual Inductance.

20. B. G.—Calibration of ammeter.

ELECTRONICS AND A. C. CIRCUITS

21. Owen's Bridge

22. De Sautyls Bridge.

23. Anderson's Bridge—Self-inductance.

24. Anderson's Bridge—Mutual Inductances.

25. Series Resonance Circuit.

26. Parallel Resonance Circuit.

27. Triode Characteristics (Static).

28. Triode Characteristics (Dynamic).

29. Tetrode Characteristics.

30. Pentode Characteristics.

31. Plate Resistance of Triode (Bridge Method).

32. Triode Constants (Bridge Method).

33. Single stage amplifier.

34. Hartley oscillator.

35. Transistor triods (Static) Characteristics.

36. Transistor Amplifier.

37. Transistor Oscillator.

DEMONSTRATION EXPERIMENTS

1. Soldering.

2. Winding of Coils.

3. C. R. O. Measurement of voltage and Frequency.
   There may be two practical classes per week during the third year.

B.Sc. (Special) Chemistry Main

Syllabus in Organic Chemistry

N.B. : Experimental demonstrations are obligatory.

Electronic interpretation of mechanism of reactions, wherever possible, is to be given.

I Year

(2 hours per week)

Introduction : Growth and scope of organic chemistry. Methods of purification of organic compounds. Criteria of purity. Detection and quantitative estimation of elements in organic compounds.

Empirical formula : Determination molecular weights of organic acids and bases, Molecular formula, Electronic theory of Valency, Structural formula, Classification and nomenclature of organic compounds. Geneva and I. U. P. A. C. systems. Function groups .

Alkenes : (Olefines). Nomenclature—general methods of preparation and properties of alkenes—individual members ethylene and propylenes reaction addition. Markownikff's rule isomerism. Alkadiencs : Isolated addition cumulative and Conjugated double bond systems. Mechanism of addition to conjugated dienes. Thiele's theory of partial valency. Elementary idea of strain theory.

Alkynes : Nomenclature—general methods of preparation and properties of alkynes. Acetylene preparation, properties and rections. Polymerisation.

Aliphatic Halogen Compounds : meno, di ; tri, and tetra halogen derivatives of paraffins—relative activity of alkyl halides—individual members—Fluorine derivatives of alkanes, Halogen derivatives of unsaturated hydrocarbons : vinyl chloride, allyl bromide westron freon and Chloroprene. Grignard Reagents—Preparation, properties and synthetic importance of the Grignard Reagents. Zinc alkyls. Lead tetraethyl.

Alcohols : Monohydric—general methods of preparation, properties and reactions. Individual members (first four members only).

Manufacture of methyl and ethyl alcohols Fermentation. Distinction between primary, secondary and tertiary alcohols. Unsaturated monohydric alcohols ; Dihydric alcohols, glycol, Trihydric alcohol—glycetol—preparation, properties and structure of glycer Nitroglycerine.

(3 hours per week)

Fundamental concepts. Different types of bonds ionic, covalent and semi-polar bonds. Theories of covalent bonding. Atomic orbital and their shapes. Molecular orbitals. Geometry of molecules and Pi bonds. Bond lengths and bond energies. Tetrahedral arrangement of valencies of the carbon atom Nucleophilic and electrophilic reagents. Carbonium ions and Carbonions. Peterolytic and homolytic fission of C C bonds. Free radicals (elementary treatment). Elementary idea of electron displacement and concept of resonance.

Isomerism—different types of structural isomerism.

Aldehydes and Ketones : General methods of preparation, properties and reactions. Individual members—Formaldehyde, acetal dehyde, and acetone Nature of carbonyl group and relative activities of Carbonyl compound. Comparative study of aldehydes and ketones. Preparation and properties of acrolein, crotonldehyde mesityl oxide and phorone.

Monocarboxylic acids : General methods of preparation, properties and reactions. Structure of carboxyl group, Relative strength of carboxylic acids. Individual members—formic acetic, proplonic and butyric acids.

Unsaturated monocarboxilic acids.

Acid Derivatives : Acid chlorides, acid amides, acid anhydrides and ester s (inorganic and organic). Fats and oils. Soaps.

Dicarboxylic Acids : General methods of preparation, properties and reactions. Individual members—oxalic, malonic, succinic, glutaric and adipic acids. Malonic, ester : Reactive methylene group. Synthetic importance of melonic ester.

Unsaturated Dicarboxylic Acids : Fumaric and maleic acids. Stereo isomerism.

Substituted Acids : Hologen substituted acids having the halogen atom at the alpha carbon atom chloracetic acids only. General methods of preparation of hydroxy acids. The influence of the position of the hydroxyl group on the behaviour of the hydroxy acids. Lactic, tartaric, malic and citric acids. Hydroxy aldehydes and ketones.

Stereo Isomerism : Optical activity, elements of symmetry, Asymmetry of the molecule. Optical activity exhibited by compounds containing one and two asymmetric carbon atoms. Methods of resolution of racemic forms, Racemisation. Walden inversion. Asymmetric synthesis, Optical activity exhibited by compounds containing elements other than carbon, Stereo—chemistry of aldoximes-and ketoximes.

Aldehydic and Ketonic Acids : Preparation of aldehydic acids, Properties of Glyoxalic acids, General methods of preparation and properties of alpha, beta and gamma ketonic acids pyruvic, acetoacetic and laevulinic acids. Acetoacetic ester preparation synthetic importance and constitution. Dialdehydes and diketones.

Tautomerism : Introduction. Prototropy and anionotropy, different types of tautomerism, Keto-enlo, amido-imido, nitro-acid or isonitroso, lactom-lactim and quinone-oxime type of tautomerism.

Aliphatic Nitrogen Compounds : Amines. Introduction, Isomerism, General methods of preparation and properties of amines, separation of amines from a mixture. Distinction between primary, secondary and tertiary amines. Individual members—methyl, dimethyl and trimethylamines, Quaternary compounds. Preparation and properties of nitroalkanes, alkyl cyanides, and isocyanides. Derivatives of carbonic acid—Urea preparation (various methods) of properties and structure. Estimation of urea.

Alphatic Diazo Compounds : Preparation and reactions of diazomethane and diazoacetic ester.

III YEAR

(4 hours per week)

Carbohydrates : Introduction. Classification. A detailed study of mono-saccharoses glucose and fructose—important reactions—constitution of glucose and fructose. Configuration general study of sucrose ; maltose, lactose, starch and cellulose methods of ascending and descending in the sugar series. Inter-conversion of aldose and ketose. An elementary idea of conformation analysis.

Alicyclic Compounds : General methods of preparation and properties of cycloparaffins. Beayer's strain theory and its modifications.

Aromatic Compounds : General characteristics of aromatic compounds—aromaticity. Simple automatic hydrocarbons and their isolation from coal-tar. Benzene—preparation, properties and reac-

tions, structure of Benzene Preparation and Properties of homologues of benzene—Toluene, xylenes, mesitylene, Synthesis of aromatic compounds from aliphatic compounds and vice-versa.

Resonance : A detailed study. Conditions and effects of resonance. Resonance Energy and its implications. Application of resonance concept to the structure of the following compounds : Benzene, Naphthalene, anthracene, carboxylate group etc.

Aromatic Substitution : Orientation of substituents in benzene. Directive influence of groups. Inductive, electromeric, mesomeric and tautomeric effects : Mechanism of aromatic mono and disubstitution reactions. Mechanism of addition reaction to systems containing double and triple bonds.

Aromatic Halogen Compounds : Preparation and properties of nuclear and side chain halogen compounds. Chloro, bromo and iodobenzenes. Benzyl chloride, benzal chloride, and benzo trichloride. Relative activity of the halogen atom in aromatic halogen compounds, Steric hindrance.

Sulphonic Acids : Methods of sulphonation. Preparation and reactions of benzene sulphonic acid, Sulphanilic acid, Sulphanilamide Saccharin.

Aromatic Nitro Compounds : Methods of nitration. Nitrobenzene and nitrotoluenes (Preparation and properties) Reduction products of nitrobenzene. Poly-nitro compounds.

Aromatic Amino Compounds : General methods of preparation and properties of aromatic amines, Aniline, chloro, bromo and nitro anilines ; acetanilide, tolu-dines phenylene diamines, diphenylamine, methylaniline, triphenylamine dimethylanilines and benzylamine.

Diazonium Compounds : Diazonisation. Preparation and reactions of benzenediazonium chloride, Structure of diazonium salts. Phenylhydrazine, azoxy, azo and hydrazobenzene, Benzidine.

Phenols and Aromatic Alcohols : General methods of preparation and properties, Individual members. Phenol, substituted phenols, eresols picric acid, dihydric and trihydric phenols, Houben-Hoesch reaction, Benzyl, alcohol, Phenolic ethers—anisole, phenetole and guiacol.

Aromatic Aldehydes and Ketones : General methods of preparation and properties of aromatic aldehydes Benzaldehyde, Preparation and properties of phenolic aldehydes. Salscylaldehyde Vanillinn Preparation and properties of aromatic ketones benzophenone, acetophenone, and quinones. Phenacyl chloride.

Aromatic Acids: General methods of preparation and properties. Benzoic acid and its derivatives. Anthranilic acid, salicylic aicd, phenylacetic acid, mandelic acid, cinnamic acid, Isomeric phthalic acids, Phthalic anhydride and phthalimide.

Colour and dyes: Theory of colour, colour and constitution—various theories. Classification of dyes. Simple azo dyes such as methyl orange, congo red and bismark brown; triphenylmethane dyes such as malachite green, rosaniline para-rosaniline and phthalein dyes such as phenolphthalemi, fluorescein and cosin.

Polynuclear Compounds: Iso'ated systems diphenyl, diphenylmethane, triphenylmethane and sibene, Condensed systems. Naphthalene—its isolation from coal-tar, reactions and structure. Nitro and amino derivatives of naphthalene naphthols naphthionic acid and naphthaquinones.

Anthracene and its derivatives: Isolation and properties of anthracene, Structure of anthracene and alixarin, Phenanthrene—Synthesis, reactions and structure.

Free Radicals: Photochemical and thermal fission of carbon—carbon bonds. Thermal decomposition of metal alkyls. Preparation of free radicals and their stability. Chain reactions and their characteristics.

Molecular Rearrangements: Whitmore generalisation or mechanism. Mechanism of the following reactions. Aldol and benzoin condention. Pinacone pinacolone rearrangement, Hofmann and Curtuis transformations; Benzilic acid rearrangement. Diazonium rearrangement, Claisen's rearrangement, Fries rearrangement, and benzidine rearrangement.

Heterocyclic Compounds: Chemistry of furan, thiophene, Pyrrole, Pyridine, quinoline and isoquinoline, indole, indozyl and indigo.

Alkaloids: Occurrence and extraction. General methods of establishing their structures. Exhaustive methylation. Structures and synthesis of coniline, pipe-rine, nicotine, quinine, cinchonine and atropine.

Terpenes Introduction Classification: Isolation, preparation and synthesis of citral geraniol, menthol, limonsene and camphor. Natural and synthetic rubbers, Synthetic resins, plastics and fibres.

Amino Acids, Polypeptides and Proteins: Methods of synthesis of amino acids and of polypeptides and their properties. An elementary idea of the structure of proteins. Vitamins—a general study.

Organic Chemistry Practical : Organic Preparations involving Oxidation, hydrolysis, nitration, sulphonation, halogenation and-diazotisation. Separation of mixtures containing (1) an acid and a hydrocarbon and (2) a base and a hydro-carbon. Determination of melting and boiling points of organic substances, Systematic identification of pure organic compounds, monofunctional and simple bifunctional and preparation of their derivatives.

Estimation of Phenol, aniline and reducing sugars such as glucose.

Books Recommended for study :

Organic Chemistry

Finar—Organic Chemistry Vol. 1 and 2.

Paul Karrer—Organic Chemistry.

Fieser and Fieser—Organic Chenistry.

Kipping & Kipping—Organic Chemistry.

Dyson : Manual of Organic Chemistry.

Hermans : Theoretical Organic Chemistry.

Hickenbottom : Reactions of Organic Compounds.

Schmidt : Organic Chemistry.

Sykes : A Guide book to Mechanism in Organic Chemistry.

Noller : Chemistry of Organic Compounds.

Vogel : Organic preparations.

Middleton : Organic Analysis.

Wield : Estimation of organic-compounds.

Wield : Characteristics of organic compounds.

Syllabus in Physical Chemistry

I YEAR

(2 hours per week)

Ideal gas laws—The laws of Boyle, Charles, Gay Lussac, Dalton, and Graham. Vapour densities—Experimental determinations by the methods of Regnault, Dumas. Hoffmann and Vector Meyer-Avogadro's hypothesis—Molecular weights of gases and vapours, limiting density.

Kinetic theory of gases—Deviations from gas laws real gases, vander Waals equation, continuity of state, the critical state, critical constants, the law of corresponding states, liquefaction of gases.

Solution of gases and solids in liquids Henry's law—Determination of their solubilities, Supersaturation—surface tension parachor—viscosity—miscibility of liquids—critical solution temperature : steam distillation, Nernst distribution law, process of extraction, osmosis, osmotic pressure and its determination. Isotonic solutions—Vant Hoff's laws of dilute solution—Raoultt's law—Measurement of vapour pressure differences—Elevation in B.P. and Abnormal molecular weights.

The First Law of Thermodynamics—internal energy and heat content—Hess's law—Heat of formation solution dilution, neutralisation and combustion—Kirchoff's equation—Relation between heats of reaction at constant pressure and constant volume-Bond energy.

II YEAR

(3 hours per week)

Maxwell's law of distribution of velocities—(statement only)—mean velocity, root mean square velocity and most probable velocity—Maxwell Boltzmann Lam—Avogadro numbers mean free path, number of binary collisions per c.c second, viscosity and molecular diameter.

Temperature concepts—Adiabatic and isothermal expansions for a perfect gas, cyclic processes—Carnot's cycle, second law of thermodynamics—Entropy, changes in reversible process—free energy and work function. The Gibbs Helmholtz equation and the Clasius—Clapeyron equation, Free energy changes in chemical reaction—chemical affinity—Van't Hoffs isotherm and isochore, criteria of thermochemical equilibrium in a system of constant composition. Thermodynamic derivation of molecular elevation constant and molar depression constant—The porous plug experiment. The Joule Thomson coefficient—Inversion temperature of a Van der Waal's gas.

Chemical kinetics—Velocity of a reaction—The law of mass action. (Thermodynamic derivation), specific reaction rate, order and molecularity of reactions.

Catalysis—criteria of catalysis, theories of catalysis, Industrial applications.

Chemical equilibrium—reversible reactions, effect of temperature, pressure and concentration on chemical equilibrium. Application of the law of mass action to the study of homogeneous chemical equilibria.

Colloids, General methods of preparation and purification—Brownian motion—Tyndall effect, absorption, coagulation ; isoelectric point—protective action—gold number—electrophoresis—determination of the size of colloidal particles—Absorption indicators, permeability of synthetic membranes—A qualitative picture of Donan membrane equilibrium ; emulsions and gels.

III YEAR

(4 hours per week)

Heterogeneous equilibria and phase rule—phase diagrams of two component systems, eutectic point of water and sulphur. Typical phase diagrams congruent and incongruent melting point, solid solutions—Thermal analysis of binary alloys—fractional crystallisation : fractional distillation of liquid mixtures—salt hydrates.

Electrolysis—Laws of electrolysis—Ionic theories—specific, molecular and equivalent conductivities and measurements, mobility of ions—Kohlrach's law of independent mobilities of ions—transport number of an ion and its determination—Ostwald dilution law—Application of conductance measurement—determination of ionic product of water—solubility of sparingly soluble salts, acid-base titrations; theory of indicators, buffer solutions, degree of hydrolysis—solubility product and its analytical applications—Modern theories of acids and bases—very weak acids and bases—strengths of acids and bases ; acid—base Catalysis—neutral salt effect.

Standard electrode potentials ; electrochemcial series, hydrogen electrode—glass electrode and calomel electrode. E. M. F. of chemical cells ; over-voltage ; variation of E. M. F. with temperature, pH and its determination—potentiometric titrations—dissolutions of metals—corrosion and passivity; Redox reactions—redox potentials and redox indicators.

Photochemistry—transmission and absorption of light ; Lambert-Beer Law—Law of photochemical equivalence Low and high quantum yields.

Elements of crystal structure—X-ray study of a cubic crystal, Miller indices—Brag's law and its use for the determination of crystal structure of sodium chloride and Potassium Chloride.

Physical properties and chemical constitution—Refractive index—dipole moment—magnetic susceptibility, adsorption spectra in relation to chemical constitution.

Atomic structure and the nature of the chemcial bond ; Rutherford atom—line spectra of hydrogen Rydberg constant, Bohr's theory of atomic spectrum of hydrogen—principal quantum number—the fine structure of hydrogen—spectrum ; azimuthal quantum number—the spin quantum number Pauli exclusion principle.

Wave mechanical model of atom (qualitative discussion) shapes of atomic orbitals, formation of a molecule—potential energy diagrams (qualitative discussion) of hydrogen molecule, hybridisation and description of bonding in methane, ethylene, acetylene, benzene and also in simple molecules like water and ammonia.

Elementary ideas of cyclotron, synchrocy clotron and linear accelerators.

Physical Chemistry Practical :

1. Vapour density (victor Meyer method).
2. Determination of surface tension of liqids.
3. Determination of viscosity of liquids.
4. Determination of transition temperature of salt hydrates.
5. Distribution coefficient and study of equilibrium between KI and I_2.

6. & 7. Heat of neutralisation of a strong acid and strong base—Heat of solution.

8. Chemical kinetics—Inversion of cane sugar.
9. Chemical kinetics—Reaction between potassium per sulphate and potassium iodide.
10. Elevation in Boiling point } Molecular weight
11. Depression in freezing point } determination.
12. Preparation of buffer and determination of pH by indicator method.
13. Adsorption of acetic acid by activated charcoal.
14. Two component phase diagram ; solid—liquid system.

Books Recommended for Study—Physical Chemistry

Glasstone : Elements of Physical Chemistry.

Daniels and Albevty : Physical Chemistry.

Maronand Pruiton : Principles of Physical Chemistry.

Walter, J. Moore : Physical Chemistry.

Hamil and Williams : Physical Chemistry.

A. J. Mee : Physical Chemistry.

A. Findlay : Experimental Physical Chemistry.

Daniels and Others : Experimental Physical Chemistry.

Syllabus in Inorganic Chemistry.

N.B.— (i) Experimental demonstration are obligatory.

(ii) In addition to portions covered by the Pre-University class syllabus, a study of the following is expected. Where the same topics as in the Pre-University Class are detail with the treatment should be of an advanced character. Manufacturing processes are to be studied, omitting engineering details.

(iii) The Chemistry (including—analytical chemistry) of the following elements and their chief compounds treated from the point of view of the long form of the Periodic Table.

I YEAR

(2 hours per week)

(i) Electronic theory of Valency ionisation energy, electron affinity, lattice energy, variable valency, electronegativity difference as a criterion for bond type Fajan's theory of ionic distortion, general properties of ionic and nonionic compounds, hydrogen bond, Chelation and oxime compounds.

(ii) Electronic configuration of atoms and the periodic classification of elements.

(iii) Atomic weights—Physical and chemical standards of atomic weights—Modern methods of determining the atomic weights.

(iv) The chemistry (including analytical chemistry) of the following elements and their compounds treated from the points of the view of the long form of the Periodic Table.

1. *Hydrogen :* Preparation, properties, manufacture and uses. Active hydrogen, deuterlum and its compounds, tritiun, ortho-para hydrogen.

2. *Oxygen:* Manufacture, properties and uses. Oxides of metals and their thermal stability. Acidic, basic and amphoteric oxides, Higher oxides.

3. *Water:* Hard and soft water. Methods of purification and softening. Water for drinking and laboratory purposes. Volumetric and gravimetric composition of water (different methods), water as a catalyst. Action of water on metals and non-metals. Heavy water. Estimation of hardness of water.

4. *Ozone and Hydrogen Peroxide:* Preparation, manufacture, properties and uses—molecular composition and structural formulae—their estimation in a given sample. Oxidation and reduction—Oxidation number.

5. *Halogens:* Isolation, manufacture, properties and uses. Hydrides, Oxides ; oxyacids and their salts. Structure of oxides and Oxyacids. Interhalogen compounds, polyhalides, pseudohalogens, Fluorocarbons and basic iodine—Volumetric composition and formulae of hydrogen halides.

6. *Sulphur:* Allotropy of sulphur, hydrides, oxides, oxyhalides, oxyacids and their constitution. Tautomerism of sulphurous acid. (Manufacture detailed study) and uses of sulphuric acid. Selenium and Tellurium and their important compounds.

7. *Metals:* One dressing, refining of metals. Furnace (non-technical treatment). The study of the following metals and their compounds. Li, Na, K, Rb, Cs, Cu, Ag, Au.

II YEAR

(3 hours per week)

1. The composition of the atmosphere. Inactive gases of the atmosphere, their discovery, isolation, properties, uses, their compounds and their position in the periodic table.

2. Allotropy of the V Group elements.

3. *Nitrogen:* Active nitrogen—its hydrides, oxides, oxyacid and their salts, properties, uses—their structure. Hydroxylamine preparation, properties and structure. Fixation of atmosphereic nitrogen (Physico—chemical principles involved). Halides and oxyhalides and sulphides.

4. *Phosphorus:* Manufacture—properties, oxides, oxyhalides, halides, sulphides, oxyacids and their salts—their structure. Phosphonium compounds, Super-phosphates of lime.

5. *Arsenic Antimony and Bismuth :* The elements, oxides, halides, oxyhalides and sulphides. Arsenates and arsenites. Antimonste of alkali metals. Sodium bismuthate.

6. *Vanadium :* Occurrence, extraction, compounds, properties and uses. Polyvalency of vanadium.

7. A comparative study of the V Group elements position in the periodic table.

8. Alkaline earth metals—Magnesium as a bridge element their compounds—position in the periodic table study of the metals and their compounds.

9. *Zinc, Cadmium and Mercury :* Occurrence, extraction properties and uses their compounds including their complexes—position in the periodic table.

10. Cement (including the analysis), nitrogen industry, artificial fertiliser and a note on match industry.

III YEAR

(4 hours per week)

1. *Carbon :* Oxides of carbon, carbonates, bicarbonates and percarbonates, carbonyl chloride carbon disulphide, cyanogenc yanid, cyanides and cyanidecomplexes (including their application in analysis,) carbides of calcium and silicon.

2. *Silicon :* Silicon dioxide, silicic acids, alkali silicates, hydrides of silicon, halides of silicon.

3. *Boron :* Oxides hydrides, halides and boric acids, sodium-borates including parborate. Boron Nitride.

4. Chemistry and manufacture of gaseous fuels, glass and abrasives.

5. The study of the following metals and their compounds.

(*a*) Aluminium, Actinium, Lanthanum (elementary treatment).

(*b*) Titanium and thorium.

(*c*) Chromium Molybdenum, Tungsten and Uranium (including polyvalency of the metals).

(*d*) Manganese (including its position in the periodic table)

(*e*) Iron, cobalt and Nickel.

(*f*) Platinum.

7. Comparative account of carbon, silicon and boron.

8. Comparative account of Iron, Cobalt and Nickel in the periodic table (including their complex compounds)

9. Comparative account of the elements of the VI Group (Chromium, Molybdenum, Tungsten and Uranium).

10. A note on pigments and paints.

11. A general study of the hydrides, carbides and nitrides of the elements of the periodic table.

12. Peracids and persalts of the elements in the periodic table.

13. Vernier's theory of Co-ordination compounds. General study of isomerism in co-ordination compounds. Sidgwick's theory of co-ordination bond, Radioactivity and radioactive transformations, General properties of (alpha) B (beta) and (gamma) rays. The disintegration hypothesis—Group displacement law. Disintegration series, Artificial transmutation of elements and artificial radioactivity, Isotopes and Isobars.

14. Principles and techniques of general analytical methods used in qualitative and gravimetric analysis.

I. INORGANIC CHEMISTRY PRACTICAL

Qualitative Analysis: Semi micro methods using the conventional scheme with hydrogen sulphide may be adopted in the first instance.

(i) *Reactions of the following radicals:* Mercury, Silver, Lead, Copper, Bismuth, Cadmium, Antimony, Tin, Iron, Aluminium, Chromium, Zinc, Manganese, Cobalt, Nickel, Calcium, Strontium, Barium, Magnesium, Potassium, and Ammonium, Sulphide, Sulphite, Sulphate, Thiosulphate, Nitrate, Nitrate Fluoride, Chloride, Bromide, Iodide, Acdetate, Oxalate, Tartrate, Arsenite, Arsenate, Phosphate, Chromate, Silicate and borate.

(ii) Analysis of mixtures of salts containing not more than six radicals including interfering acid radicals, intergroup metals and insoluble substances.

II. VOLUMETRIC ANALYSIS

A. Acidimetry and Alkalimetry :

1. Strong acid and strong base system.
2. Strong base and weak acid system.
3. Strong acid and weak base system.
4. Solubility of acidic and basic substances.
5. Determination of hardness of water.
6. Determination of Sodium Carbonate in washing soda.
7. Analysis of Sodium hydroxide flakes.
8. Determination of strength of glacial acetic acid.

B. Permanganimetry :

1. Estimation of ferrous iron.
2. Estimation of oxalic acid and oxalates.
3. Determination of ferrous and ferric iron in a mixture.
4. Determination of Calcium, Lead, Persulphate.
5. Estimation of nitrite and chlorate using Bunsen valve.
6. Determination of manganese dioxide in pyrolusite.
7. Determination of volume strength of H_2O_2.

C. Dichrometry :

1. Estimation of ferrous iron using :
   (*a*) an external indicator.
   (*b*) an internal indicator.
2. Estimation of ferric iron.
3. Determination of ferric oxide in haematite.
4. Analysis of chrome iron ore.

D. Iodimetry and Iodometry :

1. Determination of copper, arsenious oxide and hypochlorite.

2. Estimation of Tin.

3. Estimation of Iodine.

4. Purity of arsenious acid.

5. Estimation of Barium precipitating it has barium chromate and decomposing it by Kl.

6. Estimation of available chlorine in Cacloci (bleaching powder).

E. Argentimetry :

(Precipitation and complex formation).

Estimation of chlorides in neutral and acid solutions.

Use of Mohr's indicator and Ferric alum indicator . Estimation of mercury using standard ammonium thiocyanate.

III. GRAVIMETRIC ESTIMATIONS

1. Silver as chloride.

2. Lead as sulphate and chromate.

3. Zinc as oxide.

4. Magnesium as phyrophosphate and oxinate.

5. Iron as ferric oxide, using cupferron or Pyridine and hexamine.

6. Nickel as dimethyl giyoxime complex.

7. Calcium oxalate and carbonate.

8. Copper as cuprous thiocyanate.

9. Analysis of the following alloys : (a) Lead and tin in solder (b) Analysis of gun metal: copper volumetrically and tin gravimetrically (c) Analysis of brass : copper volumetrically, and zinc graivmetrically.

10. Analysis of limestone.

11. Estimation of Sulphuric, Hydrochloric, and phosphoric acids.

12. Complete analysis of hydrated barium chloride.

13. Analysis of silver coin, copper volumetrically and silver gravimetrically.

N.B.— The use of sintered glass crucible will be expected wherever possible.

Books Recommended for Inorganic Chemistry :

1. Partington—Text Book of Inorganic Chemistry.
2. Meller—Modern Inorganic Chemistry.
3. Moellor—Inorganic Chemistry.
4. Barnett & Wilson—Inorganic Chemistry.
5. Cotton and Wilkinson—Advanced Inorganic Chemistry.
6. Vogel—A Text Book of Qualitative Analysis.
7. Kolthoff & Sandell—Text Book of Qualitative Inorganic analysis.
8. Caven—Systematic Qualitative Analysis.

Physics ancillary syllabus is given at the end.

B.Sc. Zoology—(Special)

(Syllabus)

THEORY

Paper I Invertebrates and Chordates.

I. Systematics :

A general survey of the Invertebrates and chordates classified down to the orders. A knowledge of the South Indian fauna will be required. There shall be no detailed type study.

II. Functional Morphology of the Invertebrates and Chordates :

The different systems should be done on a comparative basis with stress on the Physiology of the various organs.

III. A. Study of structure of atoms and molecular reactions. Carbon and its compounds. Chemistry of living things structure of Protein carbohydrates and lipids. The nature of high energy phosphate bonds.

B. The study of basic biophysics should include.

(i) Nature of bioelectricity.

(ii) Irritable processes, muscle contractions and nervous transmission.

(iii) Transport across membrance.

(iv) Nature of vision.

(v) Molecular organisation of biological molecules (eg)

(vi) Physical and biological rhytms in nature. Insulin and Myoglobin (diurinal and seasonal cycles.)

IV. The Cell :

A. Structure of the cell :

(i) Molecular composition of the cell.

(ii) Inorganic and organic components.

(iii) Cell surface and cell membrane.

(iv) Cytoplasm and its inclusions (Mitochondria, Ribosomes ; Endoplasmic reticulom, Lysosomes, Golgi bodies and centriole).

(v) Nucleus, Nuclelus, Nucleic acid, (DNA and RNA Wats Crick model of DNA. Replication of DNA).

B. Cellular Metabolism :

Sources of energy and their transformation. Enzymes involved in energy transfer. The role of Mitochondril in these processes.

C. Cell division :
Mitosis and Meosis. The mechanics involved.

V. Organisation of cells into tissues :

1. A study of the following tissues : Epithelial, Contracitile, supporting, glandular and nervous tissues.

2. A study of the ultra-structure of nerves and muscles will be expected.

3. Darwinism, Neo-Darwinism and Modern Synthesis.

4. The genetic basis of evolution (The Hardy Weinberg law).

5. Species and modes of specificatoin (Allopatric and Sympatric).

6. The origin or higher categories.

(*a*) Developmental mechanism like Neoteny, Allometry and Deviation.

(*b*) Polyploidy.

(*c*) Quantum Evolution

7. Man in evolution. Fossil History from Australopithecus through Pithecanthropus to Home habit is and Home sapients. Natural selection and cultural evolution in Man.

PRACTICAL

I. Chemical composition of living matter.

(1) Tests for Proteins, carbohydrates and Lipids, Qualitative Demonstrations.

(2) Preparation of animal cells to be studied for cell inclusions.

II. (1) Mitosis and Meiosis—Prepared slides as well as fresh preparations of onion root-tips squash and grasshopper tests quash.

(2) Construction of a DNA model.

III. Study of various tissues—prepared slides and fresh preparations from a frog.

IV. Dissections of representative Invertebrates and Vertebrate animals. Microscopic preparations will be expected.

V. A collection of animals representative of the local fauna, should be made.

VI. (1) Analysis of water for pH, salinity, oxygen content.

(2) A simple experiment to show osmoregulation in animals—weight changes in animals.

(3) Effect of ions on neuromuscular facilitation heart preparation of F. W. Musculor Plai of Frog.

(4) Digestive enzymes—digestion of proteins, lipids and carbohydrates.

(5) Factors affecting digestion—temperature, pH enzyme and substrate concentration.

(6) Blood—haemoglobin. Simple microscopic examination and tests to explain the properties.

(7) Respiration of a terrestrial or aquatic animal.

(8) Enzyme activities.

(*a*) Gatalyse activity—H_2O_2 on Tissue.

(*b*) Dehydrogenase activity—Demonstration with TTC.

(9) Detection of ammonia, urea and uric acid in animal excreta.

(10) Detection of sugar in blood and urine.

(11) Muscle switch.

(12) Reflex action.

(13) Sensory receptors.

(14) Effect of Iodine on growth of tadpoles.

(15) Dissection of rat to locate the endocrine organs.

PAPER III PHYSIOLOGY AND ECOLOGY

VI. General Physiology.

1. Water Balance—Osmoregulation and ionic regulation.
2. Nutrition and feeding.
3. Digestion and Digestive enzymes.
4. Absorption and Storage.
5. Circulation—composition of blood.
6. Respiration—respiratory pigments.
7. Biological oxidation—energy utilisation Kreo's Cycle.

8. Excretion—Nitrogen metabolism Orthine cycle.

9. Muscle contraction—the chemistry involved.

10. Nervous transmission and integration, Receptor organs.

11. Endocrine organs and their functions.

12. Animal behaviour.

VII. Ecology.

1. Animals and plants in relation to their environment.

2. Abiotic factors—like light, temperature, humidity, chemicals.

3. Organisation of Populations, communities and Ecosystems productivity in Ecosystems.

4. Habitates—Fresh water, Marine and Terrestrial.

Paper IV Embryology, Genetics and Evolutions

VIII. Embryology :

1. Reproduction—Asexual and Sexual.

2. Development and growth of the embryo ; Embryology of a Mollusc, Echinoderm, Amphioxus, Frog ; Chick and Pig. The study should include cell lineages.

3. Elements of experimental embryology should include (*a*) Organiser ; (*b*) Differentiation ; (*c*) Regeneration ; (*d*) Axial gradients fields ; (*e*) Transplantations nucleus, tissues and organs.

IX. Genetics :

1. Mendelian Laws with problems.

2. The gene concept.

3. The interaction of genes.

4. Multiple alleles and Multiple genes with problems.

5. Linkage and crossing over—(Chromosome maps), Non-disjunction, Sex-determination.

6. Genetic traits in Main.

7. Gene action.

(*a*) Genetic code and protein synthesis.

(*b*) Epigenetic control of development the Operon theory.

(*c*) Genes in population—The Hardy weinberg Law.

8. Genetics of micro-organisms—Transduction and Transformation.

9. Heredity and environemnt—Twin studies.

X. Origin and Evolution of Life :

1. The Oparin—Haldane theory of the origin of life.

2. The Urey—Miller experiment—Amino-acid synthesis.

3. Viruses on the threshold of life. What is life ?

Principles of Evolution :

1. History of evolutionary thought.

2. Evidences for evolution.

3. Origin of adaptations—Natural Selection.

VII (1) Asexual reproduction—specimens and slides.

(2) Study of live sperms and eggs.

(3) Tadpoles and chick—to be studied at various stages.

(4) Preparation of whole mounts of chick embryos.

(5) Study of different types of placentation.

VIII. (1) Blood group testing.

(2) Mendalian traits in man—PTC tasting, Tongue rolling colour blindness, ear lobe.

(3) Culturing Drosphila—simple crosses.

(4) Squash preparation to show Mitosis, Meiosis and Chromosomes.

(5) Polygenic Characters—height, weight.

IX. (1) Parallelism and Convergence.

(2) Shells or seeds or finger prints to show the Universality of variation.

(3) Comparison of early embryos of vertebrates.

(4) Adaptive radiation—in limbs of Mammals or beaks of birds.

(5) Adaptive resemblances, critic colouration and warning colouration.

(6) Fossils—plant and animal.

(7) Simple experiments with coloured beads to demonstrate Natural selection and genetic drift.

X. (1) A regular, month-by-month study of a pond for a period of 12 months. Food webs and succession should be recorded.

(2) Fortnightly recording of the bird fauna of the college campus. At the end of a year's observation the students should be able to distinguish between the permanent residents and the visitors (and the time of the visits).

(3) Excursions to study different types of habitats—river, forest and sea-shore.

(4) A self-balanced aquarium may be set up in the laboratory and the life observed.

BOOKS

Biochemistry and Biophysics :

1. J. A. Riegal : Energy, Life and Animal organisation

2. Jellinck : Teach Yourself Biochemistry.

3. E. Baldwin : The Nature of Biochemistry.

4. R. Galambos : Nerves and Muscles—introduction to biophysics.

The Cell :

1. C. P. Swanson : The Cell.

2. A. C. Giese : Cell Physiology.

3.	De Robettis Nowinsk and Saex	: General Cytology.
4.	Brachet and Mirsky	: The Cell—Vols. I to VI.
5.	C. P. Swanson	: Cytology and Cytogenetics.

Tissues :

1.	Maximov and Bloom	: Text book of Histology.

Systematics :

1.	G. S. Carter	: General Zoology of the Invertebrates.
2.	L. H. Hyman	: The Invertebrates.
3.	B. T. Scheer	: Comparative Physiology.
4.	J. Z. Young	: Life of Vertebrates.
5.	A. S. Romer	: The Vertebrate Body.
6.	E. H. Colbert	: The Evolution of Vertebrates.
7.	Water and Sayles	: The Biology of Vertebrates.

Physiology :

1.	B. T. Sheer	: Animal Physiology.
2.	Prosser & Brown	: Comparative Physiology.
3.	Ernest Baldwin	: An Introduction to comparative Bio-Chemistry.

Embryology :

1.	L. G. Barth	: Embryology.
2.	C. P. Reven	: Outlines of Developmental physiology.
3.	B. M. Pattern	: Foundations of Embrology.
4.	J. D. Ebert	: Interacting systems in development.

Genetics :

1.	Sinnot, Dunn & Dobzhansky	:	Principles of Genetics.
2.	A. M. Winchetes	:	Genetics.
3.	E. J. Gardner	:	Principles of Genetics.
4.	Curt Stern	:	Principles of Human Genetics.

Evolution :

1.	G. G. Simpson	:	The Meaning of Evolution.
2.	J. S. Huxley	:	Evolution in action.
3.	Dobzhansky	:	Genetics and the origin of species.
4.	Ernest Mayr	:	Animal Species and Evolution.

Ecology :

1.	G. L. Clarke	:	Elements of Ecology.
2.	E. P. Odum	:	Fundamentals of Ecology.
3.	C. B. Knight	:	Basic concepts of Ecology.
4.	Allee, Emerson, Park and Schmidt	:	Principles of Animal Ecology.

B.Sc. Botany (Special) Major

(Syllabus)

Cytology :

Cell concept. Cell ultra structure. Detailed study of structure and function of cytoplasmic organelles and inclusions. Cell wall —Its primary and secondary structure, physical and chemical nature. Mitosis, meiosis and their significance. Types of nuclear divisions like Amitosis. Free nuclear division, free cell formation and cell budding— cytological tools and techniques.

Anatomy :

Meristems and Tissues. Organisation of root and stem apices. Primary and secondary tissues and their distribution in plant body. Origin of rateral and adventious roots—embryonal anatomy. Anomalous secondary growth. Anatomy in relation to Taxonomy including nodel and floral anatomy.

Biophysics :

An elementary knowledge of Biophysics as detailed below :

Microsopy. Principles of optics with reference to polarising, phase contrast, ultra, reflecting and electron microscopes. Biological tools and technique and principles underlying them. Centr'fuge, spectroscopy, chromatography and tracer technique.

Morphology :

External morphology of the flowering plants with reference to root, stem, leaf, flower, fruit and seed.

Taxonomy :

Systems of classification—Bentham and Hooker, Engler and Prantal Principles of Taxonomy—Species concept.

A study of the following families with reference to their distinguishing characters and economic importance.

Annonaceae	Nymphaeceae
Cruciferae	Sterculiaceae
Tiliaceae	Rutaceae
Meliaceae	Anacardiaceae
Leguminosae	Myrtaceae
Cucurbitaceae	Umbelliferaceae
Rubiaceae	Compositae
Sapotaceae	Asclepiadaceae
Solanaceae	Bignoniaceae

Acanthaceae	Verbenaceae
Labiatae	Amaranthaceae
Euphorbiaceae	Casuarinaceae
Orchidaceae	Scitaminaceae
Lilliaceae	Palmae
Arvideae	Gramineae

Embryology :

Development and structure of anther and pollen—Microsporangium—Microsporogenisis. Male gametophyte with reference to normal types only.

Development and structure of ovule and embryosac—Megasporogenisis, female gametophyte, Types of embryosac Fertilization ; Endosperm—Types and development, Embryo—Dicot and Monocot, Apomixis. Polyembiyony, Parthenocarpy, Embryology in relation to Taxonomy Experimental embryology.

Economic Botany :

A study of the external features, mode of cultivation, extraction and commercial use of their economic products of the following crop plants, Paddy, sugarcane, plantain, groundnut, cotton, coconut, coffee, tea and rubber.

Algae :

A general account of the structure, reproduction, relationship and evolution of trends of the following groups, with special reference to types mentioned.

Cyanophyceae :

Gloeocapsa, Oscillatoria, Nostoc.

Chlorophyceae :

Chlandomonas, Pandorina, Eudorina, volvox, cladophora, coleochaete. Schizomeris, Enteromorpha, Oedogonium, Zygnema, Des--mids, Caulerpa, Chara, Nitella.

Xanthophyceae : Botrydium, Vaucheria.

Baciliariophyceae : Diatoms.

Phaeophyceae : Ectocarpus, Dictyota, Sargassum.

Rhodophyceae : Batrachospermum, Polysiphonia, Gracilaria.

Fungi :

1. Principles of classification—general account of morphology, nutrition, sexuality, economic importance and phylogenitic relationship.

2. Morphology, structure, reproduction and life cycle of the following general:

(*a*) *Myxomycetes*—General account, plasmodiophora.

(*b*) *Phycomycetes*—Saprolegnia, Albugo.

(*c*) *Ascomycetes*—Aspergillus, Penicillium, Xylaria, Clavicepes, Peziza.

(*d*) *Basidiomycetes*—Puccinia, ustilago, Agaricus, polyporus.

(*e*) *Deuteromycetes* — Pyricularia, Fusarium, Colletotrichum, Neurospora.

A general account of Lichens—Usnea.

Bryophytes :

Marchantiales—Lunularia, Marchantia, Jungermaniales Porella. Anthocerotales—Anthoceros, Bryales—Polytrich.

Pteridophytes :

1. General characteristics and classification.

2. Structure and reproduction of the following :

General principles of Paleobotany

Psilophytales—Rhynia

Psilotales—Psilotum

Lycopodiales—Lycopodium

Selaginellales—Selaginella

Isoeteales—Isoetes

Equisetales—Equisetum

Filicales Gleichenia, Nephrolepis.

Marsiliales Marsilia.

Gymnosperm :

Cycadofilicales—General account.

Cycadales—Cycas

Bennettitales—General account

Coriferales—Pinus

Gnetales—Gnetum.

Physiology : (with elements of Biochemistry)

A study of structure of atoms, and molecules reaction of carbon and its compounds.

Structure—Properties and classification of protein Carbohydrates, vitamins and hormones.

Chemical composition of the plant—Absorption of water. Root Pressure—Ascent of Sap.

Absorption of Ions—Sand culture experiments with special reference to the use of Inorganic nutrient salts in plant growth—Nitrogen fixation.

Transpiration—Laws of diffusion—Movement of Stomata.

Wilting and its significance—Photosynthesis—Mechanism of Photosynthesis.

Chemosynthesis, Bacterial Photosynthesis, Starch and Cellulose Biosynthesis.

Protein metabolism—Fat metabolism.

Assimilation of N_2. Special methods of obtaining N_2.

Translocation of assimilated products.

Enzymes and their actions.

Respiration—Aerobic and Anaerobic Energetics.

Growth and Reproduction—Phases of growth factors of growth.

— Hermones Phytochrome, Auxin, Gibberellin, Photoperiodism, Vernalization, Movement—Classification and Types.

Ecology :

Study of vegetation. Factors of Plant habitat—units of vegetation —Types of vegetation. Characteristic features of hydrophytes, Xerophytes, mesophytes—Halophytes. Vegetation types of South India —Tropical, Mangrove Scrub.

Genetics :

Critical study of Mendelism. Interaction of genes. Linkage, Crossing over, genetic map. Allelism, Mechanism of sex determination, Chromosome Theory of heredity. Chromosomal aberrations. Polyploidy.

Mutation and factors that induce them Radiation biology origin of species—Theories of Evolution.

Evidences of Evolution.

Molecular Genetics

DNA as a genetic material. Bacteria and virus as genetic tools, Gene-action, Genetic code, Population genetics.

Plant Breeding :

Objective in plant breeding. Breeding methods—selection Hybrodisation—Inbreeding—Breeding for resistance to diseases and pests a general outline of breeding methods in self pollinated, cross pollinated and plants.

Plant Pathology :

1. A knowledge of the development of plant pathology, its economic importance the types of plant diseases and causal agents.

A general account of various control measures of plant diseases including plant protection by quarantine measure.

Symptomatology, etiology and control measures of the following diseases :

Virus diseases—Tobacco mosaic virus.

Bacterial diseases—Citrus canker

Fungal diseases—Late blight and early blight of potato.

Black stem rust, Smut of Barley.

Ergot of Rye Wilt of cotton ; Red root of sugarcane.

Deficiency diseases—Manganese deficiency.

General Microbiology :

History of Microbiology—types of Microorganism. Their special features and habitates.

Bacteria—classification—general account of structure and reproduction.

Viruses—and Bactiriophages.

Soil microbes.

Cultural methods and technique—The development and application of cultural methods.

The principles and methods of sterilization.

Apparatus required—Isolation and examination of microorganism.

Bacterial Smears.

Preparation of cultural media.

Fixing, and staining of micro-organism.

PRACTICAL

1. Acetocarmine staining—Feulgen staining.

2. To make permanent stained preparations of any plant of the groups or order in the syllabus and describe them with sketches for their identification.

3. Dissection under the simple microscope of the floral parts of phanerogames, making sketches of parts dissected. Drawing the floral diagram, giving the floral formula and giving reason for referring them to their families.

4. To describe in technical terms of plants belonging to the families of phanerogams, specified in the syllabus.

5. Field work under tuition for atleast 1 week in the I, II and III year.

6. To be able to set up experiments in plant physiology and comment on the experiment set up.

7. At the practical examination candidates are required to submit the laboratory Records, and permanent preparation of 10 slides (5 Hard sections. 3, microtome section and slides 2 smears.).

8. *Suggested additional experiments in plant physiology, Microbiology and Ecology :*

1. Methods of expressing concentration.
2. Total acidity and H-ion concentration of solutions.
3. Measurement of pH.
4. Preparation of colloids.
5. Brownian movement.
6. Water potential and water movement.
7. Some membrane properties and control of diffusion.
8. Donnon's equilibrium.
9. Plasmolysis and cell sap concentration.
10. Extraction and estimation of carbohydrates. Amino acids, proteins, Lipids and Nucleic acids. Chromatographic separation of Amino acids.
11. Enzymes—Extraction of anylase from germinating wheat grain.
12. Plant Pigments—Extraction of choloroplast pigments and their separation by chromatographic technique. Extraction of anthocyanin pigment—Absorption spectra.
13. Photosynthesis :
    (*a*) Rate of Photosynthesis in relation to light intensity.
    (*b*) Rate of Photosynthesis in relation to temperature.

14. Respiration :

Demonstration of certain respiratory enzymes in plants

15. Translocation of food.

16. Plant hormones and growth correlation.

Microbiology :

1. Preparation of culture media 2. Pure culture of bacteria and fungi.

3. Staining of bacteria.

Ecology :

A project work for each student on the ecology of given area like (1) a pond (2) Scrub jungle (3) Sand-plants (4) Mangroves.

Method of studying ecological units quadrant, transect etc.

Note :— Syllabus for Zoology ancillary is given at the end.

Detailed Syllabus for Ancillaries

(Same as for General ancillaries)

CHEMISTRY (ANCILLARY)

General and Physical

Laws of chemical combination. Dalton's atomic theory. Avogadro's hypothesis. Atoms and molucules , Combining weight, atomic weight and molecular weight.

Gas laws : Boyle's Charles's, Dalton's Graham's. General gas equation. Kinetic theory. Imperfections in gas behaviour. Van der Waals equation of state (derivation not expected). Liquification of gases. Critical constants. Liquids, vapour pressure, boiling point. Solutions of solids, liquids and gases in liquids. Determination of solubility and solubility curve. Significance of solubility curves. Henry's law. Supersaturation.

Determination of molecular, equivalent and atomic weights :

(*a*) Molecular weights—(i) From densities of gases and vapours. Method of limiting density. Regnault, Dumas, Victor Meyer and Hoffman methods. Abnormal vapour densities. Dissociation (ii) From Graham's law of diffusion (iii) From osmotic pressure, cryoscopic and ebullioscopic methods (Raoult's law). Abnormal molecular weights.

(*b*) Equivalent weights. Determination of equivalent weights.

(*c*) Atomic weights—Methods of Cannizzaro, Dulong and Petit Mitscherlich.

The structure of the atoms. Valency : Classical and electronic theories.

Classification of elements. Metals, non-metals and metalloids. Classification by Dobereiner, Newlands, Mendeleff and Lothar Meyer. Modifications.

Exothermic and endothermic reactions. Heats of solution and neutralization. Reversible reactions and the Law of mass action. Verification of the law in simple systems : application to hydriodic acid, phosphorus pentachloride and dinitrogen tetroxide.

Catalysis : Haber and contact processes. Electrolysis and its applications. Faraday's laws and applications. Theory of electrolytic dissociation. Equivalent and molecular conductivities. Degree of dissociation. Acids, bases and salts. Hydrogen ion concentration.

Colloids : Preparation and properties.

Inorganic Chemistry

Oxygen : Preparation, manufacture, properties and uses. Oxides and their classification.

Hydrogen : Preparation, manufacture, properties and uses. Heavy hydrogen.

Water : Hard and soft waters, methods of softening. Composition by weight and by volume. Hydrates, efflourescence and deliquescence.

Ozone and Hydrogen-peroxide : Preparation, properties and uses. Oxidation and reduction. Formulae.

Halogens : Comparative study of fluorine, chlorine, bromine, iodine, and their hydrides. Oxides and oxy-acids of the halogens and their salts. Bleaching powder. chlorate, bromate and iodate of potassium. Potassium per-chlorate.

Sulphur : Extraction, allotropic modifications. Hydrogen sulphide. Metallic sulphides, their solubilities and application in qualitative analysis.

Sulphurous, sulphuric, thiosulphuric acid and their salts.

Nitrogen : The composition of the atmosphere. Preparation and properties of nitrogen, Oxides of nitrogen, nitrous acid and nitric acid. Action of nitric acid on metals and non-metals.

Phosphorus : Extraction, allotropic modifications, uses. Phosphine. Chlorides, oxides; phosphorus and phosphoric acids.

Arsenic, Antimony and bismuth : Comparison ; oxides, hydrides, chlorides and sulphides. Arsenites and arsenates.

Carbon : Allotropic forms, carbon monoxide, carbon dioxide, carbon disulphide, phosgene. Carbonates and bicarbonates.

Boron and Silicon : Boric acid, sodium borate, boron trifluoride. Silicon dioxide, silicic acid and silicon terrafluoride. Alkali silicates.

A study of the following metals from the standpoint of the periodic table : Na, K, Mg, Ca, Ba, Sr, Zn, Cd, Hg, Al, Sn, Pb, Cu, Ag, Cr, Mn, Fe, Co, Ni. A general outline of the preparation of the metals from their oxides, hydroxides and sulphides. Oxides, hydroxides, and sulphides. Oxides, hydroxides, carbonates, chlorides, nitrates, sulphides and sulphates of metals.

Organic Chemistry

Purification of organic compounds. Detection and estimation of carbon, hydrogen, nitrogen, chlorine and sulphur. Empirical and molecualr formulae. Paraffin hydrocarbons upto pentane. Homologous series. Polyhalogen derivatives of methane, ethane. Alcohols upto butyl alcohols. Ethers. Aldehydes and ketones. A comparative study of acids up to butyric acids. Chlor-acetic acids. Acid chlorides, anhydrides, amides, and esters. Nitro-methane, ethyl nitrite and dimethyl sulphate. Primary, secondary, tertiary amines. Quaternary salts. Dibasic acids upto succinic acid. Lactic and tartaric acids. Optical isomerism. Fumaric and maleic acids. Geometrical isomerism. Glycol and glycerol. Glucose, fructose, cane-sugar-properties, reactions and methods of differentiation.

Benzene, toluene and naphthalene. Chlorination, nitration and sulphonation of benzene and toluene. Benzaldehyde, benzoic acid and derivatives of benzoic acid. Aniline, diazotisation and reactions of diazonium salts. Acetophenone, benzophenone. Benzyl alcohol, phenol, anisol, picric acid and salicylic acid. Phthalic acid, phthalimide and phenolphthaen.

Practical

Qualitative analysis of a simple salt. The following exercises in volumetric analysis :—(The students should do their own weighings).

1. Standardisation of an acid against sodium-carbonate.
2. Standardisation of alkali against oxalic acid.
3. Standardisation of potassium permanganate.
4. Standardisation of thiosulphate against dichromate.
5. Estimation of ferric and ferrous iron (external indicator).
6. Estimation of copper or a solution of a copper salt.
7. Estimation of silver nitrate against sodium chloride.

Books Recommended for references :

Prescott—Intermediate Chemistry (U.T.P.).

Lowry and Cavell—Intermediate Chemsitry (Macmillan).

Holmyard—Inorganic Chemistry (Arnold).

Holmyard—Organic Chemistry (Arnold).

Philbrick—Inorganic Chemistry (Bell).

Durrant—General and Inorganic Chemistry (Longmans).

Durrant—Organic Chemistry (Longmans).

Physics (Ancillary)

Only C.G.S. system of units should be employed.

Mechanics : Velocity—time curve, Parallelogram law of velocities and acceleration, uniform circular motion, simple harmonic motion, period and frequency of SHM—Composition of SHMs in a straight line and at right angles.

Forces, moments, couples. Requisites of a physical balance, Friction, Laws of friction, Limiting friction, Coefficient of friction, determination of Coefficient of friction, Elasticity, Hooke's Law, Modulli—Determination of Young's Modulusly Stretching.

Archimede's Principle applied to gases, buoyonancy, Stability of floating bodies, floating of ships, plimsol lines, Atmosphere, Atmospheric. pressure Rotary pump, Centrifugal pump, diffusion pump, Mcleod gauge.

General Physics : Surface tension, Surface energy, Capillary rise, determination of surface tension-capillary rise, drop weight method and torsion balance, surface films, Molecular layers.

Viscosity—Coefficient of viscosity, experimental determination of viscosity by capillary flow—comparison of viscosities, Ostwald viscometer.

Osmosis, osmotic pressure, experimental determination of osmotic pressure, vapour pressure of solutions—Boiling and freezing points.

Diffusion, Graham's and Fick's laws of diffusion, Experimental determination of the Coefficient of diffusion, analogy with heat conduction.

Heat : Thermometry — Resistance thermometer — thermo electric thermometer—disappearing flament pyrometer — Constant volumes hydrogen thermometer.

Determinations of linear expansion of a solid by optic lever method, apparent expansion of a liquid and absolute expansion of a liquid by Dulong and Petit's and Regnault's methods.

Determinations of sp. heats of solids and liquids by the method of mixtures—Barton's method for radiation correction (theory only) Bunsen's ice Calorimeter, Berthelot's calorimeter, Cp and Cv—their determination.

Postulates of Kinetic theory of gases, expression for pressure, gas laws, Avagadro hypothesis, Graham's law, Amaga's and Andrew's experiments Van der Waal's equation—critical Liquefaction of gases—Joule Kelvin effect, Porous plus experiment, Low temperature, Refrigerator, Airconditioner.

First law of thermodynamics—Determination of J. Searle's method, Callendar and Barne's method. Isothermal and Adiabatic changes—Ratio of Specific heats, Clement and Desorme's method. Second law of Thermodynamics, Heat engines. Carnot's engine. Efficiency, Indicator diagram, Carnot's theorem—Kelvin's scale of temperature.

Transmission of heat—conductivity, Searle's and Lee's methods. Prevosts theory, Stefan's law (statement only), Newton's law, verification sp. heat of liquid by cooling, Bolometer, Solar Constant, pyrometer.

Sound : Simple ideas of harmonic vibrations and forced harmonic vibrations and waves—forced harmonic vibrations (no derivations), resonance Lissaju figures.

Velocity of sound in air, its dependency on temperature Pressure and humidity, Progressive and stationary waves (no derivations). Reflection and refraction of sound Acoustics of buildings. Vibrations in air columns, open and closed pipes, overtones, Determination of velocity of sound in air by resonance. Transverse vibrations of strings, Sonometer. Sound recording and reproduction ultrasonics.

Light : Luminous intensity, Intensity of illumination, Photometry, Rumford, joly and Lummer-Brodhum photometers. Deviation of reflected ray by Rotating mirror, Sextant, Single optic lever. Refraction through glass slab—expressions for lateral and normal shifts, actual and apparent depth—determination of refraction index of solid and liquid by microscope, critical angle, air cell. Spectrometer—determination of μ of solids and liquids. Determination of local length of lens, auxiliary lens methods, conjugate foci method, Relation between μ f and R. Liquid lens. Combination of lenses in contact. Focal power. Gregory's reflecting telescope. Astronomic refracting telescope. Travelling microscope, Biological microscope. Epidiascope, Dispersion, radiation and absorption spectra. Fraunhofer lines, explanation. Scatteirng, molecular spectra, Raman effect.

Velocity of light, Fizeau and Foucault methods—their significance. Theories of light, Newton's corpuscular and Huygen's wave theory. Fresnel's explanation of rectilinear propagation of light. Interference Young's experiment, Fresnel's biprism, Newton's Rings experiments (reflected light). Colours of thin films, testing of planeness of surfaces, Diffraction, rectangular aperture, transmission grating —grating spectrometer, Polarisation by reflection and refraction, Brewster's law, Double refraction, Nicol, Polaroid, Rotation of plane of polarisation—half shade polarimeter.

Magnetism : Intensity of field at any point—Comparision of magnetic moments deflection of magnetic moments, Tan-A and Tan-B positions. Vibration magnetometer—measurement of M and H verification of inverse square law Magnetic properties of materials, intensity of magnetisation, susceptibility and permeability, hysterists 1-H curves, their applications. Basic concepts of ferro, dia and para magnetism. Earth's magnetic elements, dip circle.

Electricity : Induced charges, charging by induction, distribution of charge on conductor, action of points, lighting conductor, electrophorus, Van de graff generator Couloub's law of inverse squares,

Electrostatic unit of charge. Electric field and potential. Condensers, charging, capacity, action of condenser, Parallel plate condenser, electrolytic and paper condensers.

Solenoid, Ohm's law and its applications. Post Office box, Potentiometer, Electrolysis Arrhenius theory, conductivity, Kohlrausch bridge, accumulators—Lead accumulator, Edision cell, Cadmium cell. Force on a current carrying conductor in a magnetic field, Fleming's Left hand Rule Moving coil galvanometer. Thermo electric effect. Laws of electro magnetic induction, Lenz's law, self and mutual inductances, induction coil eddy current, induction furnace Transformers Power transmission.

Modern Physics: Discharge of electricity through gases—Thomson's experiment for *e-m* and Millikan's experiment for '*e*' of the electron X-rays, production by coolidge tube, Properties and uses. Photo electric emission, Quantum theory, Photo-electric cell, its applications. Radio activity—natural, artificial and induced α, β rays, properties and uses. Nuclear fission, Nuclear reactor, Energies of the future. Simple ideas on cosmic radiation. Simple ideas on the dual nature of matter, Electron microscope. Thermionic emission—diodes and triodes. Triode characteristics. Simple ideas on modulation amplification and detection, Single triode receiver. Full wave diode rectifier. Cathode ray oscillograph. Mass energy equivalance. Einstein (no derivation).

Experiments:

1. Spherometer
2. Young's Modulus by stretching
3. Surface tension capillary rise
4. Surface tension—torsion balance
5. Surface tension drop Weight method and interfacial tension.
6. Viscosity—capillary flow
7. Comparison of viscosities.
8. Linear expansion—optic lever.
9. Constant volume air thermometer
10. Specific heat of solid—mixtures

11. Specific heat of liquid—mixtures

12. Latent heat of ice

13. Latent heat of steam.

14. Newton's Law of cooling—verification

15. Specific heat of liquids—by cooling

16. Thermal conductivity—Searle's method

17. Thermal Conductivity—Lee's method

18. Refractive index of solids and liquids—Microscope.

19. Concave and convex lens—focal length conjugate foci graphical method.

20. Spectrometer—Refractive index of prism

21. Spectrometer—Hollow prism

22. Liquid lens.

23. Standardisation of grating—spectrometer.

24. Wavelength of light—grating spectrometer.

25. Newton's rings reflected system.

26. Polarimeter.

27. Defl. magnetometer—Comparison of Moments Tan-A position.

28. Deflection Magnetometer—comparison of Moments Tan-B position.

29. M & H—Vibration and deflection magnetometers.

30. Post Office box—Temperature coefficient

31. E.C.E. of copper

32. Resistance of mirror galvanometer (Not table galvanometer) Half deflection method.

33. Figure of merit of mirror galvanometer (Not table galvano meter.)

34. Kohlrausch Bridge

35. Potentiometer—Calibration of Ammeter.

36. Potentiometer—Resistance

37. Potentiometer—Calibration of Voltmeter (low range only)

38. Potentiometer—Internal resistance of a cell

39. Sonometer

40. Resonance.

Zoology (Ancillary)

(Syllabus)

Theory :

Paper 1.

Invertebratea : A study of the following animal forms as illustrative of the main characteristics of the groups to which they belong.

Amoeba, Euglena, Paramecium, Plasmodium, Hydra Obelia, Aurelia, Parasitic Worms (Liver-fluke, Tape worms and round worms), Earth-worm, Leech, Prawn, Centipede, Millipede, Cockroach, Scorpion, Fresh-water mussel, Pila, Sepia and Starfish.

Paper 2.

Chordata : A general survey of the chordata and the evolution of Vertebrate organs and organ systems with the anatomy of Shark, Frog, Calotes, Pigeon and Rabbit or Rat only as types for the various classes.

Embryology : Structure of the egg, cleavage and gastrulation processes in Frog, Chick and Rabbit. General Principles : Evidences for evolution. Theories of Lamarck, Darwin and DeWries.

A brief reference to Mendel's experiments (Monohybrid and Dihybrid only and Mendel's laws.)

Practical :

Candidates will be required to identify and describe specimens and preparations relating to the types mentioned above. They will be required to dissect and make simple microscopic preparation of Earthworm, Cockroach Fresh-water mussel, Frog, Calotes, Pigeon (Demonstration only) Crab and Rat.

Dissections of the nerves will be expected only in the case of Earth-worm, Cockroach and Frog. External characters alone to be studied in the case of Prawn, Pila and Scorpion. Practical record note-books must be submitted for valuations at the University Examination.

Botany (Ancillary)

1. The structure and life-history of the following :—Bacteria, Oscillatoria, Nostoc, Chlamydomonas, Pandorina, Volvox, Ulothrix, Oedogonium, Ectocarpus, Polysiphonia, Chara, Rhizopus, Yeast, Pencillium, Puccinia, Agaricus, Usnea, Riccia, Funaria, Selaginella, Lycopodium, Cycas.

2. External morphology of flowering plants in general and a systematic study of the following natural orders together with the economic importance of those marked in asterisks :—

Anonaceae, Nymphaeaceae, *Leguminosae, *Malvaceae, *Rutaceae, Mytraceae, *Cucurbitanceae, *Rubiaceae, Compositae, Apocynaceae, Asclepiadaceae, Convolvulaceae, *Solanaceae, Acanthaceae-Labiatae, Amarantaceae, *Euphorbiaceae, Liliaceae, Musaceae, Orchidaceae, *Palmae, *Gramineae.

3. Plant Physiology :—

Chemical composition of the plant. Soil and its nature, absorption of water and inorganic nutrients, osmosis, plasmolysis. Transpiration and factors affecting transpiration. Photosynthesis. Special methods of nutrition (heterotrophism) parasitism, saprophytism,

bacterial symbiosis, carnivory). Respiration. Growth phases and factors—Tropistic movement and movement—Geotropism, Phototropism and Hydrotropism.

4. Histology :—

Cell and its parts. Mitosis and meiosis. Meristem, primary and secondary tissues and their distribution in the angiospermous plant body (excluding anomalous types.) Structure and development of the anther, development of male gametophyte. Structure and development of the ovule and the female gametophyte. Fertilization. Parts of the typical dicotyledonous and monocotyledonous embryo.

5. Ecology :—

Chief external and internal and physiological features of Xerophytes, Mesophytes and Hydrophytes with examples from local flora.

6. General Principles :—

Evolution and Heredity.

A short account of the work of Lamarck, Darwin and deVries Heredity—Mendel's Laws of Inheritance, Monohybrid ratio, Dihybrid ratio.

7. Practical Work :—

Candidates are expected to be able to make preparations illustrating the form and structure of any plant of the orders or groups mentioned in the syllabus and to describe them with sketches sufficient for their identification ; to make dissection with the simple microscope of the floral parts of Phanerogams included in their syllabus and to make drawings, construct floral diagrams and refer them to their natural orders ; to describe in technical language plants belonging to any of the orders of groups specified in the syllabus and to describe simple setups of physiological experiments. To make, strain, mount and examine through the compound microscope and identify preparations of plant material belonging to paragraphs 1, 4 and 5. At the practical examination each candidate must submit his laboratory notebook. The practical examination will be of three hours' duration.

Books recommended :

For Study :—

1. Text-book of Botany by Lowson, Howarth and Warne—Oxford University Press.

2. Plant Kingdom by Brown-Ginn & Co., New York.

3. Structural Botany by Scott & Brooks, Volumes I and II—Macmillan & Co.

4. A Text-book of General Botany by Smith etc.—Macmillan & Co.

5. Introduction to Botany by Haupt—McGraw Hill.

6. Hand-book of Botany by Rangachary, Sekhar & Sarathy. P. Varadachari & Co.

Reference :

1. Cryptogamic Botany by G. M. Smith—Vols. I and II—McGraw Hill.

2. Text-book of Botany—Vols. I to III by Coulter, Barnes and Cowles.

3. Plant Anatomy by Eames and McDaniels—McGraw Hill.

Geology

(Ancillary)

Introduction :—The scope and sub-division of Geology.

General Geology : The earth as a planet and its relation to the other members of the solar family.

The hypothesis of the origin of the earth.

The size and form of the earth, the interior of the earth ; the physical zones of the earth. The atmosphere, the hydrosphere and lithosphere.

Land and Sea : Distribution by surface extent ; heights and depths ; the continental shelf.

Planetary Circulation : Rotational deflection ; sea breezes ; monsoons and rainfall.

Oceanic Circulation : Causes and effects ; waves and tides. Geological Agents.

(*a*) Epigene agents ; atmosphere, oceans, rivers, glaciers, and their work.

(*b*) Hypogene agents ; Volcanoes, earthquakes, their causes and effects.

Age of the earth, Marine transgression and regressions. Raised beaches. River terraces and Origin of coral reefs.

Palaeontology : Introduction : Fossils, their mode of formation ; their value in Geological and Biological Sciences, tables of the divisions of Geological time.

(1) Zoological characters and chief divisions of Protozoa—Fossils—Textularia, fusulina and nummulites.

(2) Zoological characters of the Porifera. Canal system of the sponges—Ventriculites.

(3) General characters of the Graptolites—monograptus, diplograptus.

(4) General characters and divisions of the Coelenterata—corals—cyathophyllum, zaphrentis, calceola, thecosmilia, favosites, halysites, lithostrotion.

(5) General characters of Echinodermata—echinoderms—cidaris micraste, holaster, encrinus and pentremites.

(6) General characters of Brachiopoda and brachiopod shell. Fossils—lingula, products, pentamerus, spirifer, rhynconella and terebratula.

(7) General characters of the Lamellibranchiata and lamellibranch shell—Fossils—acra, inoceramus, pecten, ostrea, gryphea, alectryonia, pectunucleus, hippurites, spondylus, unio, cardita and trigonia.

(8) General characters of the Casteropods and gasteropod shell—Fossils—Bellerophon, natica, turritella, cerithium, murex, fusus, conus, voluta, and physa.

(9) General characters of the Cephalopods, Nautiloidea and ammonoidea—Fossils—belemnites, nautilus, goniaitites, orthoceras, ceratites, scholenbachia. .

(10) General characters of the Trilobita—Fossils—Calymene, paradoxides, phacops, trinucleus.

(11) Plant fossils—glossopteris, gangamopteris, ptilophyllum, calamites and lepidodendron.

Structural and Field Geology and Stratigraphy : Order of superposition, conformable and unconformable beds, overlaps, lithology, and fossils correlation ; facies ; division of rocks into groups, system, etc. and geological time into era, epoch, etc.

Dip, strike, and outcrop ; variations in outcrops with reference to dip of bed and slope of valleys ; types of unconformity ; folds, synclines, anticlines, overfolds and fan structure. Faults, normal and reverse faults, inliers and outliers.

A course of lectures to give a comprehensive general outline of Indian Stratigraphy.

Crystallography : Definition of a crystal, crystalline and amorphous external form, variation of form and surface, law of constancy of interfacial angles, symmetry—planes, axes and centre, axial ratio, parameters, indices, symbol, Weiss and Miller, law of rationality of indices, hemihedrism and hemimorphism.

The six normal classes, the pyritothedral class, the tetrahedral class, the tetragonal sphenoidal class, the rhombohedral class, the rhombohedral hemimorphic, the trigonal trapezohedral class and their forms.

Mineralogy : Physical—crystalline aggregates, columnar and fibrous structure, lamellar structure, granular structure, imitative shapes and pseudomorphs.

Cleavage, parting, percussion figures, fracture, hardness, tenacity, sp. gr. and its determination.

Isomorphous mixture, isomorphous replacement, diomorphism, sodimorphism and pseudomorphs.

Minerals : Quartz, and the more important varieties, feldspars, orthoclase, microcline, plagioclass, hypersthene, enstatite and augite, hornblende, actionolite and termolite—micas, tourmaline, topaz, flurite, natrolite, stilbite.

Olivine, garnet, nephelin, eleucite, sodalite, beryl, epidote, staurolita, kyanite, apatite, talc, chlorite, serpentine (asbestos), kaolin, bauxite, calcite, dolomite, siderite, magnesite, selenite, gypsum, baryte, celestite, anhydrite, corundam, diamond and graphite.

Ores : Magnetite, haematite, limonite, ochre, Ilmenite, chromite, pyrite, chalcopyrite, galena, sphalerite, pyrolusite, psilomelane, malachite, azurite, graphite, gold, silver, halite and zircon.

Petrology : Igneous rocks ; their distinguishing characters, intrusive modes of occurrence—dike, sheet, laccolith, neck, stock, batholith, and lava flows. Textures and structures of megascopic study ; jointing in rocks.

Principles of classification, megascopic classification.

Description of rock types ; Granite, syenite, diorite, gabbrom norite, Peridotie, pyroxenite, amphibolite, porphyry, dolerite, rhyolite, trachyte, andesite and basalt.

Metamorphic Rocks : Metamorphic agencies and kinds of metamorphism. Texture in metamorphic rocks.

Rock types : Gneiss, slate, schist, phyllite, marble and serpentine.

Sedimentary Rocks : Classification into mechanically formed, chemically formed and organically formed rocks.

Mechanically Formed : Soil, blown sand, grit, sand-stone, clays, boulde clay.

Chemically Formed : Tufa, dolomite, rock salt, gypsum, flint and ironstones.

Organically Formed : Limestones, carbonaceous rocks and coprolites.

Practical work will comprise of the following :—

A study of the more important crystal models ; The fossil type mentioned—megascopic study of the minerals and rocks.

Exercises in plotting of outcrops on contour maps. Reading for maps relating to basis with thickness, unconformities, simple folds and an acquaintance with strike and dip faults.

Sketch maps of the following :—Physiographical features of India, Dharwar rocks of South India, Cuddapah and Vindhyan system, Gondwana system, Createaceous of Peninsular India and Deccan trap.

Books recommended for Study :—

Text-book of Geology : Longwell, Knopf and Flint, John Wiley.

Geology : Principles and processes—Emmons and others.

Introduction to Geology : Bailey, Weir and others, Macmillan & Co.

Woods : Palaeontology.

Dr. M. S. Krishnan : Introduction to the Geology of India, The Madras Law Journal Office, Madras.

Reference :

Physical Geography of India for Indian students : C. S. Fox, Macmillan & Co.

Description of rock types: Granite, syenite, diorite, gabbro, norite. Dolerite, pegmatite, lamprophyre, porphyry, felsite, rhyolite, trachyte, andesite and basalt.

Metamorphic Rocks: Metamorphic agencies and kinds of metamorphism. Textures in metamorphic rocks.

Rock types: Gneiss, slate, schist, phyllite, marble and serpentine.

Sedimentary Rocks: Classification into mechanically formed, chemically formed and organically formed rocks.

Mechanically Formed: Sand, blown sand, grit, sand-stone, clays, boulder clay.

Chemically Formed: Tufa, dolomite, rock salt, gypsum, flint and ironstones.

Organically Formed: Limestones, [illegible] and coprolites.

Practical work will comprise of the following:—

A study of the more important crystal models; The fossil types mentioned—megascopic study of the minerals and rocks.

Exercises in plotting of outcrops on contour maps. Reading for maps relating to beds with thickness [illegible] angle [illegible] and an acquaintance with strike and dip faults.

Sketch maps of the following: Physiographical features of India, Dharwar rocks of South India, Cuddapah and Vindhyan systems, Gondwana system, Cretaceous of South India and Deccan trap.

Books recommended for Study:—

Text-book of Geology: Longwell, Knopf and Flint—John Wiley.

Geology: Principles and Processes: Emmons and others.

Introduction to Geology: Miller, Wright and others, Macmillan & Co.

Woods: Palaeontology.

Dr. M. S. Krishnan: Introduction to the Geology of India, The Madras Law Journal Office, Madras.

Reference:

Physical Geography of India for Indian Students: C. S. Fox, Macmillan & Co.

CHAPTER XLVII

I. DEGREE OF BACHELOR OF COMMERCE (B.COM.)

(REGULATIONS AND SYLLABUS)

1. Candidates for the Degree of Bachelor of Commerce shall be required :

Conditions for Admission

(*a*) to have passed the Pre-University examination of this University or an examination accepted by the Syndicate as equivalent thereto ; and

(*b*) to have subsequently undergone the prescribed courses of study in an affiliated college of this University for a period of not less than three academic years or nine terms.

2. **Course of Study** The course of study shall comprise instruction in the following subjects according to syllabus and text-books prescribed from time to time.

PART I—A Language or an Alternate Subject

Language : The language taken shall not be the same as that taken for the Pre-University examination.

The course shall extend over a period of two academic years and shall comprise the study of any one of the following languages at the option of the candidate :

Foreign : French, German, Sinhalese, Burmese.

Indian : Tamil, Telugu, Kannada, Malayalam, Marathi, Oriya, Hindi, Bengali, Urdu, Gujarati.

The course shall cover the translation from the selected language and vice versa and composition which shall be in the nature of short letters dealing with commercial correspondence. No text-books will be prescribed in the language.

Alternate Subjects : Candidates may offer in lieu of the language, any one of the following papers :

(*a*) Elements of auditing

(*b*) Introduction to Law of Banking

(*c*) Elements of transport

(*d*) Elements of Co-operation

(*e*) Elements of Insurance.

The optional shall not be the same as that studied under Group B or C.

PART II—English

The course shall extend over a period of two academic years. The course shall cover :

(*a*) English prose texts—the study in detail of certain prescribed books.

(*b*) Business English.

PART III

The course for Group A shall extend over a period of two years and the course for Groups B and C shall extend over a period of three academic years and shall comprise the study of the following :—

Compulsory Subjects—Group A

(*a*) Economic analysis

(*b*) Money, Banking and International Trade

(*c*) Economic Development of India

(*d*) Economic and Commercial Geography.

Group B

(*a*) Business Organisation

(*b*) Mercantile Law

(*c*) Accountancy I

(*d*) Accountancy II

(*e*) Elements of Business Statistics.

Optional Subjects—Group C

Any one of the following with two papers :—

(*a*) Advanced Accounts and Auditing :

Paper I : Costing and Income Tax

Paper II : Auditing

(*b*) Banking :

Paper I : Comparative Banking

Paper II : Banking Law and Practice

(*c*) Trade and Transport :

Paper I : Trade

Paper II : Transport

(*d*) Co-operation :

Paper I : History and Principles of Co-operation.

Paper II : Co-operative Law and Practice

(*e*) Insurance :

Paper I : Insurance—General.

Paper II : Insurance—Life, Fire, Marine and Accident.

3. *Scheme of examination :* The scheme of examination shall be as follows :—

PART I

A Language or an Alternate Subject

	Hrs.	Marks
At the end of the Second year :		
One Paper	3	100

PART II—**English**

	Hrs.	Marks
At the end of the First Year :		
Paper I : English Prose	3	100
At the end of the Second Year :		
Paper II—Business English	3	100

PART III

	Hrs.	Marks
At the end of the First Year :		
Group : A		
Economic Analysis	3	100
Economic Development of India	3	100
Group : B		
Accountancy I	3	100
At the end of the Second Year :		
Group : A		
Money, banking and International trade	3	100
Economic and Commercial Geography	3	100

	Hrs.	Marks
At the end of the Third Year :		
Group : B		
Business Organisation	3	100
Mercantile Law	3	100
Accountancy II	3	100
Elements of Business Statistics	3	100
Group : C		
Optional—Paper I	3	100
Optional—Paper II	3	100

4. Marks required for a Pass :

PART I—A Language or an Alternate Subject

Those who have obtained 35% of marks in the paper are considered to have passed in that paper.

PART II—**English**

Those who have obtained 35% of marks in each paper at the end of each year are considered to have passed in that paper in that year.

PART III

Group A (First Year)

*Those who have obtained 35% of marks in the two papers taken together in the aggregate in the *first year* are considered to have passed in that year.

Group A (Second Year)

*Those who have obtained 35% of marks in the two papers taken together in the aggregate in the *second year* are considered to have passed in that year.

* If he fails in Group A of first or second year, he will have to appear for both the papers put together for his subsequent appearance.

PART III

Group B (First Year)

Those who have obtained 35% of marks in the paper in the *first year* are considered to have passed in that paper in that year.

Group B (Third Year)

Those who have obtained 35% of marks in the aggregate of all the four papers put together in the *third year* are considered to have passed in that year.

PART III

Group C (Third Year)

Those who have obtained 35% of marks in the aggregate of the two papers put together in the *third year* are considered to have passed in that year in that group.

Classification of successful candidates:

Candidates who obtain 60 per cent or above in groups B and C put together shall be placed in the first class. Candidates who obtain less than 60 per cent but not less than 50 per cent of the marks in groups B and C put together shall be placed in the Second Class. All other successful candidates shall be placed in th Third class.

Note : If a candidate fails in group A or B or C in any year, he will have to apper again in the failed group only at a subsequent appearance.

Transistory Provision :

The candidates who appear and fail in the examination of April/September, 1974 or earlier will be permitted

to appear either under the revised regulation or under this new regulation upto the examination of April/September, 1977. Thereafter all candidates will come under this new regulation only.

(ii) That this will come into effect from the academic year 1974-'75 (i.e. fcr those joining in July, 1974 in the first year).

Eligibility for the Degree

5. No candidate shall be eligible for the Degree of Bachelor of Commerce until he has completed the course of study prescribed and passed the examination in all the parts specified.

Classification of Successful Candidates

6. Successful candidates who pass the examinations at the first appearance and obtain 60 per cent or above of the total marks in Part I or II or Part III shall be placed in the first class in that Part. Successful candidates who obtain less than 60 per cent but not less than 50 per cent of the marks in Parts I, II and III shall be placed in the second class. All other successful candidates in Part I, II and III shall be placed in the third class. candidate securing not less than 75 per cent of the marks in any group under Parts I, II, and III of the examination shall be declared to have passed that group with distinction.

For purposes of classification, the total number of marks obtained in all the papers taken together in the aggregate under each part separately, viz. Part I, Part II and Part III will be taken into consideration.

Mark Statement

7. Statement of marks shall be furnished.

PART I—LANGUAGE

Translation from the selected language and vice versa and composition which shall be in the nature of short letters dealing with commercial correspondence. No text-books will be prescribed in the language.

ALTERNATE SUBJECT

1. ELEMENTS OF AUDITING

Meaning, objects, advantages and Principles of Auditing, Types and kinds of audit—Internal, External Audit—Audit Programme.

Internal check—Vouching—Verification of assets and liabilities. Technique of Auditing—Test Checks.

Appointment, powers, Duties and Responsibilities including liabilities of Auditor. Divisible profits—Managerial Remuneration, Investigation.

Audit of Private Concerns, Partnerships, and limited Liability Companies.

Books Recommended : Relevant Chapters in

1. R. B. Bose — Principles and Practice of Auditing (Mukerjee)

2. K. S. G. Subramanian — Text-book of Auditing.

2. INTRODUCTION TO LAW OF BANKING

Definition of banking Legal relationship of Banker and Customer.

Procedure for opening and conduct of accounts of (a) individual including minors and married women, (b) Joint customers (*c*) partnership firms (*d*) limited companies (*e*) registered and unregistered club, societies etc. (f) executors, administrators and trustees (g) Liquidators and receivers, (h) local authorities.

Bank pass books or Statement of Accounts. Current Account, Savings Bank Account and Deposit Account.

Cheques : Drawing of cheques, post dated cheques—Rule in Clayton's case. Regular and irregular endorsements. Crossings—General and special, " a/c payee ", " not negotiable ".

Rights and duties of paying and collecting banks. Statutory protection given in connection with the payment and collection of cheques. Collection of clean and documentary bills (demand and usage). Savings Accounts and Fixed Deposits Insurance Scheme.

Issue and payment of Demand Drafts and Telegraphic Transfers Telegraphic Codes.

Rights of banks against surety. Precautions. Advances secured by goods or Documents of Title to goods: Bill of Lading. Life policies. Advances against jewellery and Bullion.

Books Recommended : Relevant chapters in

1. A. K. Basu — Fundamentals of Banking—(Mukerjee and Company)

2. B. C. Ghosh — Introduction to Banking Practice and Law—(O. U. P.)

3. ELEMENTS OF CO-OPERATION

Meaning and scope of co-operation—its genesis and development. History of Co-operation in India—Ancient Indian Institutions—Beginning of modern movement—evolution since 1904.

Structure of Co-operative institutions of various types and at various levels. Objectives, functions and working of the various types of co-operative institutions, credit or multi-purpose or service society at the village level, both of small and large size : District Central Co-operative Bank ; Urban Credit Societies ; Salary earners Co-operative Societies ; Urban Banks ; State Co-operative Bank ; Primary Co-operative Marketing Society and Purchase and sale Union—District Marketing Union ; State Marketing Federation ; All-India Co-operative Marketing Federation ; Industrial Co-operative ; Housing Co-operatives ; Consumers' Co-operatives ; Primary and Central Land mortgage banks ; processing societies ; Milk supply societies and union.

Evaluation of the movement in India—its achievements, handicaps and weaknesses—re-organisation of the Movement in India, Reserve Bank's efforts—Constitution and working of the Agricultural Credit Department of the Reserve Bank of India—its role in the sphere of agricultural credit, State Bank of India—Finance for marketing and processing—Future of Co-operation in India.

Books Recommended : Relevant chapters in

1. K. R. Kulkarni — Theory and Practice of Co-operation in India.

2. Srivatsava — Co-operation in India and abroad (Rastogi & Co.)

4. ELEMENTS OF TRANSPORT

The Economics of Railway, Road, Shipping and Air-Transport—the functions of transport ; the demand for transport—organisation—ownership tendency to monopoly ; State aid ; nationalisation.

Transport in India : (a) Roads : Modes of road transport ; development and present position ; Road finance—Road—Rail competition. Private versus State ownership.

(b) Railways : History and present position development of railway traffic State purchase and construction ; separation of railway finances ; nationalisation of railways ; Re-grouping of railways. Basis of rates and fares Rate-making in Practice. Classification of goods Regulation of rates and fares. Railway Rates Tribunal. Railway Board—its function and relation with the public.

(c) Water : Inland Waterways ; Possibility of development of inland waterways in India. Coastal shipping—Shipping by foreign companies, development of Indian enterprises—Competition—Government policy. Rate making, Rate wars, rebates and deferred rebates, Shipping Conferences. Indian mercantile Marine—present position. Development of ship-building. State aid. Port owner-ship and administration.

(*d*) Air-transport : Nature and scope of air-transport. Development of Civil Aviation in India and its position before nationalisation —Present position.

Books Recommended : Relevant chapters in

1. Batnagar — Transport in Modern India.

2. M. K. Gosh — Transport Development and Co-ordination.

5. ELEMENTS OF INSURANCE

1. Nature and meaning of insurance—various types of insurance contracts. History of insurance growth—present position in India—Economic and Social importance—Different insurers, General procedure

in issuing policies—general study—Agents—Brokers—Insurers and underwriters—Proposal—Cover—Note-Slip—Reports—Policy conditions—Endowments and policies—Stamp-duty—settlement of claims.

Important policy conditions in life, Fire, Marine. Motor Insurance, Workmen's compensation insurance.

Books Recommended : Relevant chapters in

1. Sharma — Insurance in India—(Vora & Company)
2. Gosh & Agarwal — Principles and Practice and Law of Insurance, (India Press).

PART II—ENGLISH

Paper I—English Press : Prescribed text-books.

Paper II—Business English.

(Paper I will be taught by the Department of English and Paper II will be taught by the Department of Commerce).

(Syllabus)

Letter-writing, commercial correspondence, letters of application for a situation, reference and appointment. Letters concerning enquiries, offers, orders, sales, complaints, claims and settlement of accounts, letters dealing with status enquiries. Letters concerning foreign trade, Agency correspondence, business circulars, drafting of minutes. Correspondence with Governments, Central and State.

Drafting of Reports—of individual reports of committees, drafting of reports for the Press Market. Reports : preparation and Interpretation—writing reports—from statistical data—drafting replies to questionnaires—drafting of short speeches of Chairmen—Precise of commercial matter advanced commercial correspondence.

In addition the student should be taught sentence structure, paragraph building, comprehension and precise writing. An attempt should also be made to build up a vocabulary mecessary for expressing basic ideas of Commerce and Economics " by means of Commercial Essays ".

PART III—Group A

1. ECONOMIC ANALYSIS

Introductory : Nature and significance of Economics, Scope and methods of economic enquiry and analysis, economic statistics and dynamics, basis of modern economic structure, private property, freedom of contract. Competition and monopoly. Production—agents of production and their changing importance. Quantity and quality of labour. Division and functions. Combination of factors of production, location, laws of returns. Scale of production. Types of productive organisation. Rationalisation.

Value and exchange : Wants, Utility, Law of demand and Elasticity, Indifferent curves, Law of substitution. Consumer's surplus, Theories of value. Equilibrium of demand and supply. Joint supply and joint demand. Short and long period prices. Theory of monopoloy price. Price discrimination. Value under monopolistic competition. Speculation.

Distribution : General theory. Wages, differences in earnings. Theories of wages. Minimum wages. Trade Unions and wages, Unemployment Theories of interest. Short-term and long-term rates of interest, rent. Nature and theory of rent. Quasi rent. Nature and theory of profits National income and its distribution. Inequality of incomes. Theories of population. State in relation to distribution. Planned economy. Socialism.

Public Finance : Economic functions of State. Sources of Public revenue. General Principles of taxation. Kinds of taxes. Public expenditure. Classification of public debts and their redemption. Budgeting and fiscal policies.

PART III—Group A

2. MONEY, BANKING AND INTERNATIONAL TRADE

Monetary System : Monetary Institutions. Money markets, developed and undeveloped. Banking. Central Banking in Theory and practice :—Instruments of Central Banking Control. Objectives of Central Banking. Central Banks and Treasuries. Central Banking and economic development. Commercial Banking. Mixed Banking, Development Banks ; Monetary Theory :—Value of money. Liquidity Theory of Money, Objectives and Monetary policy. Non-banking Financial Intermediaries and Monetary policy.

Inflation, open and suppressed, Demand pull and cost push. Inflationary Gap.

Trade cycles. Fluctuations in Income and Employment. International Trade and Theory of comparative cost. Balance of payments. Tariffs and other forms of trade policy. Foreign Exchange. Purchasing—Power Parity Theory. Equilibrium Rate of Exchange, Exchange control. International Financial Institutions.

PART III—Group A

3. ECONOMIC DEVELOPMENT OF INDIA

The paper should be analytical and not merely descriptive. Greater emphasis should be given to the developments during the planning period.

Synopsis

1. Economic Development of India—Colonial capitalism—Mixed Economy.

2. *National Income* : Sectoral distribution of national income—National income and its measurement.

3. Population—Leading features of the population situation—Trends in population growth, Regional and Occupational—Population policy.

4. *Agriculture*—

(*a*) *Feature of Indian Agriculture* : Agricultural output and national income agricultural productivity and income—land utilisation and crops—cultivation system and techniques—landless labour—land holdings—size of holdings—tenures— Agricultural marketing—rural indebtedness—Agricultural finance and co-operation.

(*b*) *Agricultural policy and its implementation*—

(i) *Land policy* : Abolition of Intermediaries tenancy legislation—fixation of ceiling—co-operative farming — service co-operatives — consolidation of holdings and prevention of fragmentation—bhoodan and gramdan, landless workers, community development and national extension services, role of panchayats in rural reconstruction.

(ii) *Agricultural Finance* : Nature and type of finance —Regulation of money—lending and debt legislation—Co-operative credit—Crop loans—Banking and rural credit—Reserve Bank and rural credit.

(iii) *Marketing* : Regulation of Marketing—Co-operative marketing societies, Regulated Markets, ware-housing Corporations—Forward trading and its Regulations—State Trading—International commodity Agreements.

(iv) *Prices* : Instability of agricultural prices—Price regulation—Price support policies.

(v) *Food Problem :* Production and demand—Marketable surplus—Food prices.

(vi) Agriculture in the plants.

5. *Industries* :

(*a*) *Main features of Indian Industries* : Major industries of India, their growth and structure—Location—Small Scale and Cottage Industries—Consumer and capital good Industries.

(*b*) (i) *Industrial Policy and its implementation* : Problems of large scale *Vs*. Small scale Industries: Capital intensive *Vs*. Labour intensive Consumer Goods and Capital Goods industries. Industrial Policy of Government, Protection to Industries—State agencies for Industrial Development—Taxation and Industry.

(ii) *Industrial Finance :* Specialised agencies for Industrial finance — Foreign capital — Industrial finance and Managing Agency system — Industrial finance and banking system.

6. *Labour :* Labour and industrial development—Wage policy —Industrial disputes and their settlement— Collective bargaining. Workers' participation in management—Development of trade unions —Development of social security—Labour legislation—Labour policy in the plans.

7. *Trade and Transport* :

(i) Agencies of Internal trade — Problem of control and regulation—State trading and Financing of trade.

(ii) *Foreign trade:* Volume, Composition, Direction Impact on economic development — Balance of payments—Exchange control—Export promotion—Exchange value of the Rupee—India and the I.M.F. Trade Agreements—State trading and Financing of trade.

(iii) Development of different forms of transport—Problems of their co-ordination—Transport in the plans.

8. *Banking*: Feature of banking in India—Indian Joint Stock banks—Exchange banks—banks and credit structure—Banks and their nationalisation—Reserve Bank of India—Credit control and regulation—State Bank and its role.

9. *Monetary systems:* Money market—organised and unorganised —Reserve Bank of India—Capital market—Bill Market-Money supply and prices.

10. *Public Finance:* Financial system of Indian Union—Taxation structure—Mobilization of resources for development, Taxation and fiscal policy—Implications of deficit financing—Foreign aid—Trends in Public expenditure—Development expenditure under the plans—Finance Commission Character of Indian Public Debt.

11. *Planning:* Importance of Planning for the economic development of India—Salient features of Plans—Priorities, targets—Finance ; Physical and financial resources—Capital formation—Problems of savings—Deficit Financing — Role of foreign capital and foreign aid—Achievements of Plans—Factors affecting successful implementation of Plans —Planning machinery—Socialistic pattern of society.

PART III—Group A

4. ECONOMIC AND COMMERCIAL GEOGRAPHY

1. *Resources and Industry*: A study of the process of economic development.

2. The effects of physical environments upon economic organisation of societies—The limitations of physical environment in explaining the emergence of economic institutions. The role of social institutions in affecting economic life.

3. Critical study of world's economic resources ; (*a*) economic development and agriculture ; stable and variable factors in productions ; distribution of agricultural resources, their trade and prospects ; (*b*) the changing role of minerals in the economy ; use characteristics

of minerals ; distribution, conservation practices, trade and outlook; (c) Forests, distribution, conservation practices, trade problems and needs in forest conservation ; (d) fisheries of the world, the factors of development ; the trade and markets ; (e) animal and animal products trade.

4. The fundamentals of manufactures—Mechanical energy and its significance, basis of world's industrial location—Principal industrial regions—The distribution of Major Industries, their trade and prospects.

5. Transportation—Evolution of transport. Transport pattern of the world—speed and cost—Transport co-ordination and integration—Transport cost and its impact upon world distribution of productive activities—Transportation and regional specialization—Ports, Entrepot, Trade Centres of the world.

6. Trade—Trade as an index of civilization—Difference in the stage of industrial development—Difference in available resources—Trend of world trade—Industrialization and foreign trade—The changing world economic nationalism in relation to economic progress—Free market and controlled economy.

7. Economic Geography of the principal countries of the world—Principal economic products—Chief Industries — Ports and Cities, communications—Trade balance and trade relationship.

INDIA :—

8. (a) The physical environment, the social environment. (b) The background of agriculture—Crops and methods ; achievements in agriculture. The problems of agriculture. Irrigation and river valley projects. (c) Mining in India's economy ; production and trade. (d) Major manufacturing industries of India—Problems of production and trade. (e) Transport—Available means of transport—Present condition and problems. (f) India's foreign trade—Composition and direction of trade—Balance of trade — trade relationship—Problems and prospects.

PART III—Group B

1. BUSINESS ORGANISATION

Meaning of Business and Organisation—Social and Individual aspects of business. Basic principles of Organisation. The evolution of Industry ; Industrial and Commercial development.

The structure of Modern business ; Factors determining structural forms. Nature, constitution and organisation of Sole Trader, Partnership Firm and Joint Stock Company.

Size of the Business Unit—Tendency towards large-scale operation, optimum size of firm. Location of Plant.

Joint stock company organisation: Features and forms. Size pattern of joint stock companies in India. Promotion and Management including Secretarial Work.

Organisation of Trade: Inland Trade and Foreign Trade. Wholesale Trade and Retail Trade. Multiple Shops, Departmental Stores, Consumers' Co-operative Stores, Mailorder Business, Sales Policy—Advertising and salesmanship.

Organisation of Finance: Short-term and long-term capital. Methods of financing trade and industry.

Principles and practice of joint stock finance. Institutional finance. Stock Exchange and Produce Exchange.

Industrial Combinations: Causes and forms, Pools, Cartels, Trusts, Holding Companies, interlocked directorate—Their social effects. Government's control of Industry and Trade.

Administrative Organisation of business: Line, Line and Staff, and Functional Organisation. Scientific Management—Rationalisation of Industry.

Organisation of labour: Methods of remuneration. Non-pecuniary incentives.

Elements of organisation and management of Public Utility undertakings and State Enterprises.

PART III—Group B.

2. MERCANTILE LAW

Indian Law relating to contracts, Partnerships, sale of goods, Negotiable instruments. Fire and Marine Insurance, Arbitration, Elements of Company Law—Section 1 to 388 only.

PART III—Group B

3. AND 4. ACCOUNTANCY

Paper I

The theory and practice of single and double entry book-keeping and Accounts. Meaning, objects and Advantages of book-keeping and Accountancy, distinction between Single and Double entry systems.

Principal and subsidiary books of accounts, Methods of keeping and presenting accounts.

Bank transaction : Petty cash transaction : Transaction relating to Bills of Exchange.

Tiail Balance : Errors and Rectification. Receipts and Payments and Income and Expenditure Accounts of Educational, Charitable and other institutions.

Manufacturing, trading and Profit and Loss Account and Balance Sheet.

Accounts Current and Average due date ; Self balancing ledgers. Goods on sale and return ; Consignment and Joint Ventures.

Paper II

Hire purchase and Instalment systems. Departmental and Branch accounts (excluding foreign branches).

Partnership Accounts ; Accounting problems including those relating to admission, retirement, death, dissolution and conversion into Joint-stock company.

Joint-stock company Accounts ; issue of shares and Debentures, including underwriting. Forfeiture of shares, Redumption of preference shares and Debentures—Acquisition of Business.

Final Accounts and Balance Sheet of companies—Dividends Bonus shares, sub-division and consolidation of share capital—Reduction of share capital. Accounts relating to amalgamation, absorption and reconstruction of companies. Valuation of Goodwill and shares and treatment of Goodwill system and Maintenance of Stock records and valuation of stock-in-trade. Nature and methods of Depreciation. Capital and Revenue, including deferred revenue expenditure. Treatment of Bad and Doubtful Debts, Royalty Accounts, Sinking Funds, Provision, Reserves and Reserve Funds.

Simple interpretation and criticism of Accounts including Accounting Ratios. Company Liquidation and Insolvency Accounts. Final accounts and accounting problems of Insurance Companies, Banks and contractors.

PART III—Group B

5. ELEMENTS OF STATISTICS

Statistical Methods

General nature and scope of Statistics and Statistical Methods—

Limitations of Statistical Methods. Collection, Editing, Classification and Tabulation of Data Rates, Ratios and Percentages.

Presentation of Data: Diagramatic and Graphic Presentation, Frequency Distributions, Approximation and Accuracy.

Measures of central tendency, mean, median, quartiles, Deciles Percentiles, Mode, Geometric Mean, Harmonic Mean—Methods of calculation and application.

Dispersion: Absolute and relative measures of Dispersion Range, Quartile Deviation, Mean Deviation, Standard Deviation and Co-efficient of variation, Skewness and Kurtosis.

Simple correlation.

Interpretation of Statistics—Precautions in Interpretation, Errors in Interpretation.

Analysis of Time Series and Business Forecasting, Methods of measuring Trend and Seasonal changes.

Index Number: Concept of Index Numbers—problems of construction and use of Index Numbers—Tests of an Index Number ; Index Numbers in current use.

Vital Statistics.

Statistical System in India. Growth of Official Statistics in India—Present Organisation.

Nature and sources of statistics relating to Population, Agriculture, Industry, Labour, Prices and Trade. A knowledge of the defects in Collection and Compilation of these statistics and suggestions for improvement.

OPTIONAL SUBJECTS

PART III—Group C

1. ADVANCED ACCOUNTS AND AUDITING

Paper I—**Costing and Incometax**

Costing

(60 Marks)

Objects and advantages of costing—Elements of Cost. Principles of Allocation and Apportionment. Books and Records to be maintained. Direct Materials—Purchase and Issue Routine including Forms for Record ; Requisition, Bin Card and Stores Ledgers. Methods of pricing the Issue. Losses. Recording and Control of Materials.

Methods of Costing—Their suitability for various Productive and service organisations—features of Costing Methods. Budgetary Control.

Direct Labour : Time Recording and Time Analysis. Methods of Remuneration ; Treatment of Overtime and Idle time.

Direct Charges and Indirect Expenses—Classification, Estimation methods of Recovery—Interest—Depreciation.

Presentation—Cost Sheet—Cost Ledger—Production and Process Accounts—Job Accounts—Contract Accounts.

Reconciliation of Costing and Financial Books.

Usefulness of Marginal Costing—its implication in operation.

Standard Costing—Use of variance Analysis. Relation between Standard Costing and Budgetary Control.

Incometax

(40 Marks)

Law and Practice of Incometax. Definitions ; Distinction between Capital and Revenue—Exempted Incomes—Heads of Incomes including Capital Gains. Computation of Taxable Income of individuals, Hindu Undivided Families, Partnership Firms and Companies, Advanced Payment of Tax. Depreciation—Carry-forward and Set-of losses.

Paper II—**Auditing**

Meaning, Objects, Advantages and Principles of Auditing, Types and kinds of Audit, Internal External Audit—Audit programme.

Internal Check—Vouching—Verification of assets and liabilities. Technique of Auditing Test Checks. Share Transfer Audit.

Appointment, Powers, Duties and Responsibilities including liability of Auditor.

Divisible Profits, Managerial Remuneration, Investigation.

Audit of Private Concerns, Partnerships, Banks, Hotels, Educational, Charitable and other Institutions and Limited Liability Companies.

PART III—Group C

2. BANKING

Paper I—**Comparative Banking**

Indian Banking : Evolution of Banking. Different types of Banking Institutions—Indigenous Banks, Joint-Stock Banks, Investment Trusts, Post-Office Savings Bank, Co-operative Banks, Exchange Banks. The Money Market. The Foreign Trade. Financing of industries. Efficiency of banking. Relation between different types of Banking Institutions.

Foreign Banking : A study of the Banking System of the U.K., the U.S.A., Germany, France and Japan.

The International Bank for Reconstruction and Development. The International Monetary Fund and its allied institutions.

Paper II—**Banking Law and Practice**

Evolution of Indian Banking Law. Indian Negotiable Instruments Act, 1881. Banker's Books Evidence Act.

Definition of banking. Legal relationship of Banker and Customer.

Procedure for opening and conduct of accounts (*a*) Individuals including Minors and Married Women, (*b*) Joint Customers, (*c*) Partnership Firms, (*d*) Limited Companies, (*e*) Registered and Unregistered Clubs, Societies, etc., (*f*) Executors, Administrators and Trustees (*g*) Liquidators and Receivers, (*h*) Local Authorities.

Steps to be taken on death, lunacy of customer, on dissolution of Partnership, winding-up of Company, Issue of Garnishee Order, etc.

Bank Pass Books or Statement of Accounts. Current Account, Savings Bank Accounts, and Deposit Account.

Cheques : Drawing of cheques, post-dated cheques—Rule in Clayton's case. Regular and irregular endorsements. Crossings—general and special, " a/c payee ", " not negotiable ".

Rights and Duties of Paying and Collecting. Banks Statutory protection given in connection with the payment and collection of cheques.

Banking Companies Act, 1949—its main provisions and recent amendments. Reserve Bank's control over joint stock banks and other institutions receiving deposits from the public.

Collection of clean and documentary bills (demand and usance). Savings Accounts and Fixed Deposits, Deposits Insurance Scheme.

Issue and payment of Demand Drafts and Telegraphic Transfers. Telegraphic Codes.

Employment of Bank's Funds : Important factors governing Cash Reserves. Profitable uses of funds—Call Loans investments in Stock Exchange Securities.

Stock Exchanges and their main functions—their importance for economic development. Cash shares and settlement shares. Government control over Stock Exchanges.

Importance of character of borrowers. Examination of statement of their liability and assets. Advances against Stock Exchange securities, Debentures and Shares—equity and preference. Market values and lending values. Share certificates and transfer forms. Limit of advances against shares of certain companies. Margins and their importance.

Guarantees : Advances secured by Guarantees and Indemnities pros and cons. Scope of Guarantee. Application of Guarantee to the whole or part of the debt. Effects of release of a co-surety. Negligence or improper handling of securities. Rights of banker against Surety. Precautions—Advances secured by goods or Documents of Title to goods.

General Precautions : Borrow to be trustworthy and experienced in handling the goods which he is offering. Dealing with owners of goods or agent in possession.

Advances against goods or produce offered should be necessaries of life. Proper care in valuation. Proper storage and insurance of goods pledged. Advances against documents of title to goods —Bill of Lading, Dock Warrants, Warehouse-keeper's certificates, Delivery Orders and Railway Receipts, Distinction between documents that give title to goods and those that are mere receipts. Special precautions in case of advances against Documents of Title to goods. General precautions.

Miscellaneous Securities : Land and building—their unpopularity. Difficulties in satisfying banks regarding customer's title. Heavy expenses of legal mortgages. Frigid nature of the security. Difficulty in valuation. Advances against Life Policies—existence of insurable interest—redeeming features of Life Policies as securities. Advances against Jewellery and Bullion, Fixed Deposits, Stock-in-trade. Banks and Hire-purchase Finance—importance of this line by banks abroad.

Subsidiary services—Agency services :

(1) Payment of subscriptions, premia, rents and collection of promissory notes, coupons, dividends, salaries pensions, etc.

(2) Purchase and sale of stocks and shares.

(3) Acting as Trustee, Executor and Attorney.

(4) Serving as correspondent and representative of its customers, other banks and financial corporation.

Miscellaneous or General Utility Services :

(1) Receiving of Deeds, Securities and other valuables for safe custody.

(2) Dealing in Foreign Exchange.

(3) Issuing of Letters of Credit, Circular Notes, Travellers Cheques, etc.

(4) Serving as referee regarding the financial position, business reputation and respectability of his customers.

(5) Underwriting of loan raised by Governments, Public Bodies and trading corporations.

(6) Providing a specialised advisory service to customers. Safe custody deposit. Distinction between gratuitous bailee and bailee for reward. Banker's liability for negligence. General precautions. Conduct of Safe Deposit Vaults.

Foreign Exchange Control—Pasis of control—Licensing of Dealers Authorised to do Foreign Exchange Business—remittances to countries outside India. Methods of payments for imports. Exports—main requirements regarding exports.

PART III—Group C

3. TRADE AND TRANSPORT

Paper I—**Trade**

Background of Modern Trade and Commerce, A survey of the development of trade from the beginning of the 19th Century to date.

Foreign trade: Reasons for foreign trade. Benefits of foreign trade. Foreign trade of Great Britain, the U.S.A., the U.S.S.R. and Japan.

Commodities of Commerce—Primary products: Tea, rubber, wheat, sugar, cotton, jute, oilseeds, iron, tin and mineral oil. Manufactured goods.

Problems of International Trade: State Trad'ng ; Cartels ; Inter-Government Commodity Control agreements ; Trade Agreements, including preferential agreements ; Charter for International Trade Organisation.

India's Foreign Trade: Direction, volume and composition of India's trade. Trade in relation to Balance of Payments. Financing of foreign trade.

India's Internal Trade: Importance of Internal Trade, Factors helping or retarding internal trade. Organisation of wholesale trade in rice, wheat, sugar, and oilseeds. Structure of trade by river, rail and road since World War I.

Paper II—**Transport**

The Economics of Railway, Road, Shipping and Air Transport with reference to the following ; the functions of transport ; the demand for transport and specialisation ; organisation ; ownership ; tendency to monopoly ; State aid ; Nationalisation ; rate-making ; transport co-ordination.

Transport in India :

(*a*) *Roads :* Modes of road transport ; development and present position ; Road finance. Road—rail competition. Private *versus* State ownership.

(*b*) *Railways :* History and present position ; development of railway traffic ; State purchase and construction ; Separation of railway finances ; nationalisation of railways ; new convention on separation of railway finance. Re-grouping of railways. Basis of rates and fares. Rate-making in practice Classification of goods. Regulation of rates and fares. Railway Rates Tribunal. Railway Board—Its function and ralation with the public.

(*c*) *Water :* Inland waterways :—Possibility of development of Inland waterways in India. Coastal shipping—Shipping by foreign companies development of Indian Enterprises—Competition—Government policy. Rate-making—Rate-wars, Rebates and Deferred Rebates. Shipping Conferences. Indian Mercantile Marine—Present position and future prospects. Development of ship building, State aid, Port ownership and administration.

(*d*) *Air Transport :* Nature and scope of air transport. Development of civil aviation in India and its position before nationalisation. Present position and future prospects of air transport in India.

PART III—Group C

4. CO-OPERATION

Paper I—**History and principles of Co-operation**

Philosophy of Co-operation—Co-operation as a principle Meaning and scope of co-operation, its genesis and development. Brief history of the movement in Europe, the U.S.A., China and Japan.

History of Co-operation in India. Ancient Indian institutions beginning of modern movement—evolution since 1904. Progress in various States since Independence—place of Co-operation in the Five Year Plans. Government's role in promotion and regulation of the co-operative institutions—Departments and Ministries at State and Union levels—the Co-operative Development Board—Warehousing Co-operation.

Structure : co-operative institutions of various types and at various levels. Objectives : functions and working of the various types of co-operative institutions—Credit or multi-purpose or service society

at the village level, both of small and large size; District Central Co-operative Bank ; Urban Credit Societies ; Salary earners co-operative societies ; Urban Banks ; State Co-operative Bank ; Primary Co-operative Marketing Society and Purchase and Sale Union, District Marketing Union—State Marketing Federation ; All India Co-operative Marketing Federation, Industrial Co-operatives; Housing Co-operatives ; Consumers' Co-operatives ; Primary and Central Land Mortgage Banks ; Processing Societies ; Milk Supply Societies and Union.

Evaluation of the movement in India—its achievements, handicaps and weaknesses—Reorganisation of the Movement in India, Reserve Bank's efforts—Constitution and working of the Agricultural Credit Department of the Reserve Bank of India—its role in the sphere of agricultural credit. State Bank of India—Finance for marketing and processing. Future of Co-operation in India.

Paper II—**Co-operative Law and Practice**

Main features of the Co-operative Law in Principal foreign countries. Origin and history of Co-operative legislation in India. A detailed study of the Co-operative Societies Acts of 1904 and 1912.

Formation, registration and organisation of different types of co-operative societies—Conditions of registration—Certificates of registration—Limited and unlimited liability. Membership. General Body. Managing committee. Model bye-laws—Amendment of bye-laws.

Borrowings of funds as loans and deposits from members and non-members—security for loans.

Investment of funds in and outside the business. Restrictions on the division of profits, reserve funds, charitable funds, dividend, bonus, remuneration, etc. Accounts pertaining to co-operative societies —books and accounts to be maintained difference—between double entry and the system in vogue in co-operative societies.

Audit and inspection—distinguishing features of audit, supervision, inspection and enquiry. Scope of co-operative audit—who is responsible for audit—who can audit—important points in audit reports—responsibilities of auditors—audit certification—audit fee—Audit memo — rectification report. Inspection—scope of inspection —who can inspect a society—preparation of Inspection Notes—issue of Inspection Memo. Enquiry into the constitution, working and financial condition of a society.

Supersession and dissolution of Managing Committee, Disputes under—Co-operative law — how to file a dispute—who can decide a dispute—bar of jurisdiction of civil courts—review, appeal and revision of award.

Liquidation—cancellation of registration. Concessions granted to registered societies—exemption from compulsory registration of documents ; remission of income-tax on profits ; exemption from registration fees and stamp duty on documents relating to business of societies.

Organisation of the Co-operative Department. Powers of the Registrar.

PART III—Group C.

5. INSURANCE

Paper I—**Insurance—General**

1. Nature and meaning of insurance—Various types of insurance contracts—History of insurance growth—Present position in India. Economic and Social Importance—Different insurers.

2. General procedure in issuing Policies—A general study Agents—Brokers—Insurers and Underwriters—Proposals—Cover—Note—Slip—Reports—Policy conditions—Endorsements—Policies—Stamp duty—Settlement of claims.

3. Insurance Contracts—General Principles of Contract—Special legal principles applied to insurance contracts—Insurable Interest — Assignment — Indemnity Subrogation — Contribution — Average—Utmost good faith—Material facts, representation, warranties, etc.—Proximate cause—Moral Hazard—Physical Hazard.

4. General principles of premium fixing—Tariff rates—Retention and Reinsurance—Facultative and (Treaty—Different types of treaties.

5. Office organisation and routine—Field organisation and salesmanship.

6. Insurance Company accounts—Special records—Expense ratio—Annual returns—Taxation of insurance profits.

7. Insurance Act of 1938 and rules 1939.

8. State and Insurance—Social Security—Employee's State Insurance Corporation—General objects of L.I.C.

Paper II—**Insurance—Life, Fire, Marine and Accident**

A. Life: Purpose and scope of life Policies—various types of Policies and their special uses—Annuity—Group—Procedure to effect Policies—Application of the legal principles—Prospectus Proposal—Reports—Classification of risks —Selection—Extra risk—Policy and conditions—Automatic non-forfeiture—Assignment Nomination—Title—Settlement.

Common diseases—Their causes—Effect on longivity Underwriting of substandard lives—Lien Reinsurance. Premium elements Compound interest—Mortality tables—Annuity rates loading—Valuation —Distribution of profits—General treatment.

Investment of Life Fund.

Provisions of 1938 Act and Rules 1939 relating to Life Insurance, Life Insurance Corporation Act, 1956 and Rules.

B. Fire, Marine, Personal Accident, Motor, Employee's Liability, Guarantee, Aviation, Burglary, etc.

Application of general legal principles—Kinds of Policies and their uses—Procedure in issuing Policies—Proposals—Cover-Note Slip—Reports—Policy terms and important conditions—Endorsements—Settlements of claims — Reserve for unexpired risk—Renewal receipts.

Provisions of 1938 Act and Rules relating to General Insurance.

Books for Study:

1. Dinisdal : Elements of Insurance (Pitman).
2. P. A. S. Mani : Life Insurance in India (Hindustan Advertisers, Bombay).
3. Dr. R. M. Ray : Life Insurance in India (Allied Publishers, Bombay).
4. Sarma : Insurance in India (Vora and Company).
5. Gosh and Agarwal : Principles, Practice and Law of Insurance (India Press).

Books for Reference:

1. National Planning Committee : Insurance.
2. Insurance Act, 1938 and Rules, 1939.
3. Life Insurance Year Book.

4. Tam : A Guide to Life Assurance.

5. Venkoba Rao : Insurance Law in India.

6. Young and Bacon : Principles and Practice of Life Assurance.

7. Welsen and Taylor : Insurance Administration (Pitman).

8. Smith : Marine Insurance.

9. Banfied : Accident Insurance (Pitman).

10. Sprage and Sprague : Insurance Company Accounting.

11. Godwin : Fire Insurance.

BOOKS FOR STUDY AND REFERENCE

PART II

Paper I : Texts will be prescribed from time to time.

Paper II—Business English

Books for Study :

1. Pink and Thomas : English Grammar, Composition and Commercial Correspondence.

2. G. M. Moitra : Higher Grade English Composition for Commerce students.

3. Lorenzo : Market Reports.

4. Lorenzo : Business Correspondence.

Books for Reference :

1. Head, Fonssett and Wilson : Manual of Secretarial Practice.

2. Stepenson : Principles and Practice of Commercial Correspondence.

3. Government Office Manual.

PART III—GROUP A

1. ECONOMICS ANALYSIS

Books for Study :

1. Dewett : Modern Economic Theory.

2. Benham : Economics.

3. Meyers : Elements of Modern Economics.

Books for Reference :

1. J. R. Hicks : The Social Frame Work.
2. Cairncross : Introduction to Economics.
3. Alexander Gray : Development of Economic Doctrines.
4. Dalton : Public Finance.

2. MONEY BANKING AND INTERNATIONAL TRADE

Books for Study :

1. E. Thomas : Banking, Currency and Exchange.
2. K. Sanyasiah : Money, Banking and International Trade.

Books for Reference :

1. Crowther : Outline of Money.
2. Sayers : Modern Banking.
3. Muranjan : Modern Banking in India.
4. Whale : International Trade.
5. Panandikar : Banking in India.
6. Evitt : Foreign Exchange.

3. ECONOMIC DEVELOPMENT OF INDIA

Books for Study :

1. Jathar : Indian Economics.
2. Wadia and Merchant : Our Economic Problem.

Books for Reference :

1. Jathar and Beri : Indian Economics Volume I and II.
2. Balakrishna : Studies in Economic Problems.
3. Malhotra D.K. : History and Problems of Indian Currency.
4. Vera Anstey : Economic Development of India.
5. Nanavati and Anjaari : Indian Rural Problems.

4. ECONOMIC AND COMMERCIAL GEOGRAPHY

Books for Study :

1. A. Das Gupta : Economic and Commercial Geography of the World.

2. Dudley Stamp : Commercial Geography.

3. Dubey : Commercial Geography.

Books for Reference :

1. Stamp and Suggeate : Geography for today, Book V. World.

2. Chisholm and Stamp : Handbook of Commercial Geography.

3. Dudley Stamp : Intermediate Commercial Geography Vols. I and II.

PART III—GROUP B

1. BUSINESS ORGANISATION

Books for Study :

1. Shukla : Business Organisation and Management.

2. Naidu and Dutta : Fundamentals of Business Organisations.

3. Bahl : Business Organisation.

4. Davar : Business Organisation.

Books for Reference :

1. Bahl : Secretarial Practice.

2. Acharya : Essentials of Business Organisation.

3. Haney : Business Organisation.

4. Kimball : Industrial Organisation.

5. Taylor : Principles of Scientific Management.

2. MERCANTILE LAW

Books for Study :

1. Venkatesan, E. : Mercantile Law.
2. Shukla : Mercantile Law.
3. Davar : Mercantile Law.

Books for Reference :

1. Stevens : Mercantile Law.
2. Indian Contract Act.
3. Partnership Act.
4. Sale of Goods Act.
5. Negotiable Instruments Act.
6. Shaw : Lectures on Company Law.

3. AND 4. ACCOUNTANCY

Books for Study :

1. Batlibai : Advanced Accounts.
2. Rup Ram Gupta : Advanced Accounts.

Books for Reference :

1. Shukla and Grewal : Advanced Accounts.
2. Carter : Advanced Accounts.
3. Pickles : Advanced Accounts.
4. Cropper : Higher Book-keeping and Accounts.
5. Spicer and Pegler : Book-keeping and Accounts.

5. ELEMENTS OF STATISTICS

Books for Study :

1. Asthana : Elements of Statistics.
2. Ghosh and Chowdry : Statistics Theory and Practice.
3. Boddington : Statistics and their application to commerce.

Books for Reference :

1. Corxton and Cowden : Applied General Statistics.
2. Allen : Statistics for Economics.
3. Mills : Statistical Method.
4. Whelden : Business Statistics.
5. Bowley : Element Manual of Statistics.

PART III —Group C

1. ADVANCED ACCOUNTS AND AUDITING

Books for Study :

A. (1) Glover and Williams : Elements of Costing.

(2) Biggs : Cost Accounts.

(3) A Nag-Pal : Illustrated Law and Practice of Incometax.

B. (4) Batlibai : Practical Auditing.

(5) Tandon : Practical Auditing.

Books for Reference :

A. (1) Whelden : Cost Accounting and Costing Methods.

(2) Batlibai : Works Organisation, Management Cost Control.

(3) Indian Income-tax Act—Rules and Manual.

(4) Rup Ram Gupta : Law and Practice of Income-tax.

(5) A. N. Iyer : Law of Income-tax.

B. (6) De Paula : Principles of Auditing.

(7) Spicer and Pegler : Practical Auditing.

2. BANKING

Books for Study :

A. (1) Panandikar : Indian Banking..

(2) Makenzie : Banking Systems of U.K., U.S.A., France and Germany.

B. (3) Tanan : Banking Law and Practice in India.

(4) Thomas : Practice and Law of Banking.

(5) Davar : Banking Law and Practice in India.

Books for Reference :

A. (1) Sayers : Banking in British Commonwealth.

(2) Decock : Central Banking.

(3) Muranjan : Banking in India.

(4) S. K. Basu : Recent Banking Development.

(5) Reserve Bank Bulletins.

B. (6) Sheldon : Practice and Law of Banking.

(7) Charley : Law of Banking.

3. TRADE AND TRANSPORT

Books for Study :

A. 1. Ellsworth : International Economy.

2. Paduval : Recent Trends in India's Foreign Trade.

3. Harrod : The International Economics.

B. 4. Bonavia : Economics of Transport.

5. Bhatnagar and others : Transport in Modern India.

6. M. K. Gosh : Transport Development and Co-ordination.

Books for Reference :

A. 1. Syrett : Practice and Finance of Foreign Trade.

2. Ganguli : Reconstruction of India's Foreign Trade.

3. Meade : Balance of Payments.

4. Snider : Introduction to International Economy.

5. Review of the Trade of India—Government of India Publications.

B. 1. Srinivasan : Law and Theory of Railway Freight Rates.

2. Air Transport Enquiry Committee Report.

3. AcWorth : Elements of Railway Economics.

4. Fenelon : Economics of Road Transport.

5. Walker : Road and Rail.

6. Motor Vehicles Taxation Enquiry Committee Report.

4. CO-OPERATION

Books for Study :

A. 1. Casselman : Co-operative Ideals and Principles.

2. K. R. Kulkarani : Theory and Practice of Co-operation in India.

B. 1. Austin : Madras Co-operative Manual.

2. Calvert : Law and Principles of Co-operation.

Books for Reference :

A. 1. Fay : Co-operation at Home and Abroad.

2. International Year Book of Co-operation.

3. Report of the Co-operative Planning Committee.

4. Five-Year Plan.

5. Rural Credit Survey Report.

B. 1. Viyanna : Madras Co-operative Societies Act.

2. Co-operative Societies Act.

3. Registrar's Circulars and Model By-laws.

II. ONE YEAR B. COM. DEGREE COURSE

(For Diploma-Holders in Commercial Practice)

REGULATIONS AND SYLLABUS

Regulations

1. Candidates for the one year B.Com. degree course shall be required :

Qualifications

(*a*) to have passed three year Diploma course in commercial practice conducted by the State Board of Technical Education, Madras, with a minimum of 45% in each paper and 50% average.

(*b*) to have subsequently undergone the prescribed course of study in the Government Polytechnic for a period of not less than one academic year.

2. The course of study shall comprise of the instructions in the following subjects according to the syllabus and text-books prescribed from time to time.

Under Part I, Diploma in Commercial Practice syllabus, the student shall also be taught (any language other than English) Translation, Composition, Business Correspondence

OR

Course of Study

an alternative subject like

(*a*) Introduction to Law of Banking

(*b*) Elements of Co-operation

(*c*) Elements of Transport

(*d*) Elements of Insurance.

Diploma holders in commercial practice appearing for one year degree B.Com. should pass the above part to be eligible for awarding the one year B.Com. degree conducted by the University, as a transitory provision, until Part I as mentioned is introduced in the three year diploma in commercial practice. No student is eligible for one year B.Com. degree until he passes Part I as recommended, whether in three year diploma in commercial practice course or in one year B.Com. degree course conducted by the University. In the transitory period the University will conduct the Part I examination.

The post diploma commercial practice one year B.Com. course shall be extended for a period of one year and shall consist of the following 7 subjects divided into 3 Groups.

Group A

1. Economic Analysis
2. Economic Development of India
3. Money Banking and International Trade.

Group B

1. Auditing
2. (Any language other than English) Translation, Composition Business correspondence OR an alternative subject as mentioned in Part I.
3. Elements of Statistics.

Group C

Optional (Any one subject—Two papers)

(*a*) Special accounts and Cost accounts.

(*b*) Insurance.

(c) Co-operation.

(d) Income Tax Law and Practice.

1. A Student who takes (any language other than English) Translation, Composition Business correspondence under Part I shall not be permitted to take the same under Group B paper (2) i.e., if (any language other than English) is chosen under Part I then the student shall take an alternative subject under Group B paper (2).

2. An alternative subject selected under Part I shall not be the same as that selected under Group B paper (2).

3. The optional subject shall not be the same as that studied under Part I or Group B paper (2).

Scheme of Examination

	Hrs.	Marks
3. Under Part I (any language other than English) translation, composition, Business Correspondence OR alternative subject	3	100
Group A		
1. Economic Analysis	3	100
2. Economic Development of India	3	100
3. Money Banking and International Trade	3	100
Group B		
1. Auditing	3	100
2. (any language other than English) Translation, Composition and Business correspondence	3	100
3. Elements of Statistics	3	100

Group C

Optional (any one—Two papers)

1.	Paper I	3	100
	Paper II	3	100

4. A candidate should be declared to have passed if he/she obtains not less than 35% in the aggregate in each group. A candidate securing less than 35% in the aggregate in each group shall be required to appear again in all the papers under the group.

Passing Minimun

5. There will be no classification for Part I and Group A. For the purpose of classification the total number of marks in all the papers taken together in the aggregate under Groups B and C will be taken into consideration. Successful candidates who obtain 60% or above of the total marks in Groups B and C only shall be placed in the First class, successful candidates who obtain less than 60% but not less than 50% in Groups B and C shall be placed in the Second class. All other successful candidates shall be placed in the Third class. A candidate securing not less than 75% in any paper under Groups A, B or C shall be declared to have passed in that paper in Distinction.

Classification of Successful Candidates

ALTERNATE SUBJECTS

A. INTRODUCTION TO LAW OF BANKING :

Definition of Banking, legal relationship of Banker and Customer :

Procedure for opening and conduct of accounts of (*a*) Individual including minors and married women (*b*) Joint customers (*c*) Partnership firms (*d*) Limited Companies (*e*) Registered and unregistered clubs, societies etc. (*f*) Executors, administrators and trustees (*g*) Liquidators and receivers (*h*) Local authorities.

Bank pass books or Statement of Accounts, Current Account, Savings Bank Account and Deposit Account.

Cheques : Drawing of cheques, post dated cheques, Rule in Clayton's case, Regular and irregular endorsements, Crossings, General and special ' a/c payee ' ' not negotiable '.

Rights and duties of paying and collecting banks, statutory protection given in connection with the payment and collection of cheques. Collection of clean and documentary bills (demand and usage) Savings Accounts and Fixed Deposits Insurance Scheme.

Issue and payment of Demand Drafts and Telegraphic Transfers Telegraphic codes.

Rights of Banks against surity, Precautions. Advances secured by goods or Documents of Title to goods; Bill of Lading, Life Policies Advances against jewellery and Bullion.

Books Recommended :

Relevant Chapters in

1. A. K. Basu : Fundamentals of Banking (Mukerjee and Company).

2. B. C. Ghosh : Introduction to Banking Practice and Law— (O. U. P.).

B. ELEMENTS OF CO-OPERATION :

Its genesis and development, History of Co-operation in India, Ancient Indian Institutions, Beginning of modern movement, evolution since 1904.

Structure of Co-operative institutions of various types, Objectives, functions and working of the various types of co-operative institutions, Credit or multipurpose or service society at the village level, both of small and large size ; District Central Co-operative Bank ; Urban Credit Societies ; Salary earners Co-operative Societies ; Urban Banks ; State Co-operative Bank ; Primary Co-operative Marketing Society and Purchase and Sale Union, District Marketing Union, State Marketing Federation ; All-Indian Co-operative Marketing Federation ; Industrial Co-operatives ; Housing Co-operatives ; Consumer's Co-operatives ; Primary and Central Land Mortgage Banks ; Processing Societies ; Milk Supply Societies and Union.

Evaluation of the movement in India, its achievements, handicaps and weaknesses, reorganisation of the movement in India, Reserve Bank's efforts. Constitution and working of the Agricultural Credit Department of the Reserve Bank of India, its role in the sphere of agricultural credit, State Bank of India, Finance for marketing and processing, Future of Co-operation in India.

Books Recommended :

Relevant Chapters in

1. K. R. Kulkarani : Theory and Practice of Co-operation in India.

2. Srivatsava : Co-operation in India & Abroad (Rastogi & Co.)

C. ELEMENTS OF TRANSPORT :

The economics of Railway, Road, Shipping and Air-transport, the functions of transport, the demand for transport, organisation, ownership tendency to monopoly ; State Aid, Nationalisation.

TRANSPORT IN INDIA :

(*a*) Roads, modes of road transport ; development and present position ; road finance : Road-Rail competition, Private versus State Ownership.

(*b*) Railways : History and present position, development of railway traffic, State Purchase and construction, separation of railway finances, nationalisation of railways, Re-grouping of railways, Basis at rates and fares, Rate making in practice. Classification of goods,

Regulation of rate and fare, Railway Rate Tribunal ; Railway Board, its function and relation with the public.

(*c*) Water : Inland Waterways : Possibility of development of inland waterways in India. Coastal shipping, shipping by foreign companies, development of Indian enterprises ; Competition, Government Policy. Rate making, Rate wars, rebates and deferred rebates : Shipping conferences. Indian Mercantile Marine, present position, Development of Ship, Building, state aid, Port ownership and administration.

(*d*) Air transport : Nature and scope of air transport, Development of Civil Aviation in India and its position before nationalisation, present position.

Books Recommended :

Relevant Chapters in

1. Batnagar : Transport in Modern India.
2. M. K. Ghosh : Transport Development and Co-ordination.

D. ELEMENTS OF INSURANCE :

Nature and meaning of insurance, various types of insurance, contracts, history of insurance growth, present position in India, economic and Social importance, different insurers, general procedure in issuing policies, general study, agents, brokers, insurers and under-writers, proposal, cover note, slip, reports, policy conditions, endowments and policies, stamp duty, settlement of claims.

Important policy conditions in life, Fire, Marine, Motor Insurance, workmen's compensation insurance.

Books Recommended :

Relevant Chapters in

1. Sharma : Insurance in India, (Vora & Company).
2. Gosh & Agarwal : Principles and Practice and Law of Insurance (India Press).

SYLLABUS

Group A

1. ECONOMIC ANALYSIS

Introduction :

Nature and significance of economics, scope and methods of economic enquiry and analysis, economic statistics and dynamics, basis of modern economic structure, private property, freedom of contract. Competition and monopoly, production, agents of production and their changing importance, combination of factors of production, location, laws of returns, scale of production, types of productive organisation, rationalisation.

Value and Exchange :

Wants, utility, laws of demand and elasticity indifferent curves, law of substitution. Consumer's surplus, theories of value. Equilibrium of demand and supply, joint supply and joint demand, short and long period prices, theory of monopoly price, price discrimination. Value under monopolistic competition, speculation.

Distribution :

General theory, wages, differences in earnings, theories of interest, short-term and long-term rates of interest, rent, nature and theory of rent, quasi rent nature and theory of profits, national income and its distribution, inequality of incomes, theories of population, state in relation to distribution, planned economy, socialism.

Public Finance :

Economic functions of State. Sources of public revenue, general principles of taxation, kinds of taxes. Public expenditure, classification of public debts and their redemption, budgetting and fiscal policies.

Books Recommended :

1. Dewett : Modern Economic Theory.
2. Benham : Economics.
3. Mayers : Elements of Modern Economics.
4. J. R. Hicks : The Social Frame Work.

5. Clairncross : Introduction to Economics.

6. Alexander Gray : Development of Economic Doctrines.

7. Dalton : Public Finance.

2. ECONOMIC DEVELOPMENT OF INDIA

The paper should be analytical and not merely descriptive. Greater emphasis should be given to the developments during the planning period.

3. SYNOPSIS

1. *Economic Development of India.*

Colonial capitalism, mixed economy.

2. *National Income.*

Sectoral distribution of national income, income and its measurement.

3. *Population.*

Leading features of the population situation, trends in population growth, regional and occupational, population theory.

4. AGRICULTURE

A. *Feature of Indian Agriculture :*

Agricultural output and national income, agricultural productivity and income, land utilisation and crops, cultivation system and techniques, landless labour, land holdings, size of holdings, tenures, agricultural marketing, rural indebtedness, agricultural finance and co-operation.

B. *Agricultural Polity and its Implementation*

(i) *Land Polity :*

Abolition of Intermediaries tenancy legislation, fixation of ceiling, co-operative farming, service co-operatives, consolidation of holdings and prevention of fragmentation, Bhoodan and Gramdan, landless workers, community development and national extension services, role of Panchayats in rural reconstruction.

(ii) *Agricultural Finance :*

Nature and type of finance, regulation of money, lending and debt legislation, co-operative credit, crop loans, banking and rural credit, Reserve Bank and rural credit.

(iii) *Marketing :*

Regulation of marketing, co-operative marketing societies, regulation markets, Ware Housing Corporations, forward trading and its regulations. State Trading, international commodity agreements.

(iv) *Prices :*

Instability of agricultural prices, price regulation, price support policies.

(v) Agriculture in the plans.

5. INDUSTRIES

(*a*) *Main Features of Indian Industries :*

Major industries of India, their outgrowth and structure, location, small scale and cottage industries, consumer and capital goods industreis.

(*b*) *Industrial Policy and its Implementation :*

Problems of large scale vs. small scale industries; capital intensive vs. labour intensive, consumer goods and capital goods, industries, industrial policy of Government, protection to industries, state agencies for industrial development, taxation and industry.

(*c*) *Industrial Finance :*

Specialised agencies for industrial finance, foreign capital, industrial finance and managing agency system, industrial finance and banking system.

6. LABOUR :

Labour and industrial development, wage policy industrial disputes and their settlement, collective bargaining, workers' participation in management, development of trade unions, development of social security, labour legislation, labour policy in the plans.

7. TRADE AND TRANSPORT :

(i) Agencies of internal trade, problem of control and regulation, state trading and financing of trades.

(ii) Foreign trade : Volume, composition, direction, impact on economic development, balance of payments, exchange control, export promotion, exchanage value of the rupee, India and the I. M. F., trade agreements, state trading and financing of trade.

(iii) Development of different forms of transport, problems of their co-ordination, transport in the plans.

8. BANKING :

Feature of banking in India, Indian Joint Stock Banks, Exchange Banks, Banks and credit structure, banks and their nationalisation, Reserve Bank of India, credit control and regulation, State Bank and its role.

9. MONETARY SYSTEMS :

Money market, organised and unorganised, Reserve Bank of India, capital market, bill market, money supply and prices.

10. PUBLIC FINANCE :

Financial system of Indian Union, taxation and structure, mobilization of resources for development, taxation and Fiscal policy, implications of deficit financing, foreign aid, trends in public expenditure, development expenditure under the plans, Finance Commission, character of Indian public debt.

11. PLANNING :

Importance of planning for the economic development of India, salient features of plans, priorities, targets finance, physical and financial resources capital formation, problems of savings, deficit financing role of foreign capital and foreign aid, achievements of plans, factors affecting successful implementation of plans, planning machinery, socialistic pattern of society.

Books Recommended :

1. Jathar : Indian Economics.

2. Wadia and Merchant : Our Economic Problem.

3. Jathar and Beri : Indian Economics Volume I and II.

4. Balakrishna : Studies in Economic Problems.

5. Malhotra D.K. : History and Problems of Indian Currency.

6. Vera Ansley : Economic Development of India.

7. Nanavathi and Anjaari : Indian Rural Problems.

3. MONEY, BANKING AND INTERNATIONAL TRADE

Monetary system : Monetary institutions, money markets, developed and undeveloped. Banking, central banking in theory and practice ; instruments of central banking control, objectives of central banking, central banks and treasuries, central banking and economic development, commercial banking, mixed banking, development banks, monetary value of money, liquidity theory of money, objectives and monetary ploicy, non-banking financial intermediaries and monetary policy.

Inflation, open and suppressed, demand pull and cost push, inflation gap.

Trade Cycles : Fluctuations in income and employment, international trade and theory of comparative cost, balance of payments, tariffs and other forms of trade policy, foreign exchange, purchasing power parity theory, equilibrium rate of exchange, exchange control, international financial institutions.

Books Recommended :

1. E. Thomas : Banking Currency and Exchange.

2. K. Sanyasiah : Money, Banking and International Trade.

3. K. P. M. Sundaram : Money, Banking, Trade and Finance.

4. Crowther : Outline of Money.

5. Sayers : Modern Banking.

6. Whale : International Trade.

7. Muranjan : Modern Banking in India.

8. Panandikar : Banking in India.

9. Evitt : Foreign Exchange.

Group B

1. AUDITING

Meaning, objects, advantages and principles of auditing, types of and kinds of audit, internal external audit, audit programme.

Internal check, vouching, verification of assets and liabilities, technique of auditing, test checks, share transfer audit.

Appointment, powers, duties and responsibilities including liability of auditor.

Divisible profits, managerial remuneration, investigation.

Audit of private concerns partnerships, banks, hotels, educational, charitable and other institutions and limited liability companies.

Books Recommended :

1. Batlibai : Practical Auditing.
2. Tandon : Practical Auditing.
3. De Paula : Principles of Auditing.
4. Spicer and Fegler : Practical Auditing.

3. ELEMENTS OF STATISTICAL METHODS

General nature and scope of statistics and statistical methods, limitations of statistical methods, collection, editing, classification and tabulation of data rates, ratios and percentages.

Presentation of data : diagramatic and graphic presentation frequency distributions approximation and accuracy.

Measures of central tendency, mean, median, quartiles, deciles percentiles, mode. Geometric Mean, Harmonic Mean—methods of calculation and application.

Dispersion : Absolute and relative measures dispersion, range, quartile deviation, mean deviation, standard deviation and coefficient of variation skewness and kurtosis.

Simple correlation.

Interpretation of statistics, precautions in interpretation, errors in interpretation.

Analysis of time series and business forecasting, methods of measuring, trend and seasonal changes.

Index number : Concept of index numbers, problems of construction and use of index numbers, tests of an index number, index number in current use.

Vital statistics.

Statistical system in India, growth of official statistics in India, present organisation.

Nature and sources of statistics relating to population, agriculture, industry, labour, prices and trade. A knowledge of the defects in collection and compilation of these statistics and suggestions for improvement.

Books Recommended :

1. Asthana : Elements of Statistics.
2. Ghosh and Choudry : Statistics Theory and Practice.
3. Boddington : Statistics and their application to commerce.
4. Corxton and Cowden : Applied General Statistics.
5. Allen : Statistics for Economics.
6. Mills : Statistical Method.
7. Whelden : Business Statistics.
8. Bowley : Elements Manual of Statistics.

Group C

OPTIONAL :

(*a*) SPECIAL ACCOUNTS AND COST ACCOUNTS :

Paper I—**Special Accounts**

1. Advanced problems in partnership accounts, amalgamations, absorption, reconstruction and liquidation, valuation of shares, branch accounts, hire and instalment purchase, royalty accounts.

2. Double accounts, treatment of replacement and renewals.
3. Accounts of holding companies.
4. Bankruptcy accounts.
5. Fire claims.
6. Bank and insurance accounts.
7. Criticism of balance sheets and final accounts.

Books Recommended :

1. Dr. A. N. Agarwala : Higher Science of Accountancy.
2. M. C. Shukla : Advanced Accountancy.
3. J. R. Batlibai : Advanced Accountancy.
4. Spicer Fegler : Book-keeping and Accounts.
5. R. R. Gupta : Advanced Accountancy.
6. Pickles : Accountancy.

Paper II—**Cost Accounts**

1. Objects and advantages of costing, books and records, control and pricing of materials, bin cards and stores ledgers, elements of cost.
2. Oncost and methods of allocating of oncosts.
3. Methods of remuneration of labour, their effect, oncost time rate—piece rate and premium bonus schemes.
4. Cost control accounts and reconciliation with financial books
5. Unit cost, process cost, operating cost
6. Fixed and variable costs, breakeven point.
7. Machine accounting.

Books Recommended :

1. Wheldon : Cost Accounts.
2. Bigg : Cost Accounts.
3. Sirkar : Cost Accounts.
4. J. R. Batlibai : Works Organisation and Cost Control.

5. Sarkar : Principles : Practice of Cost Accounting.

6. Bhar : Cost Accounting Methods & Problem.

7. Dobeson : An Introduction to Cost Accountancy Vol.I, II and III.

8. M. C. Shukla & T. S. Grewal : Cost Accounts.

9. H. J. Wheldon : Cost Accounting & Costing methods.

Group C

OPTIONAL :

(*b*) INSURANCE

Paper I—**Insurance—General**

1. Nature and meaning of insurance, various types of insurance contracts, history of insurance, growth, present position in India, economic and social importance, different insurers.

2. General procedure in issuing policies, a general study, agents, brokers, insurers and underwriters, proposals, cover note, slip, reports, policy conditions, policies stamp duty, settlement of claims. endorsements.

3. Insurance contract, general principles of contract, special legal principles applied to insurance contracts, insurable interest, assignments, indemnity subrogation, contribution, average utmost good faith, material facts, representation,warranties etc., proximate cause, moral hazard, physical hazard.

4. General principles of premium fixing, tariff-rates, retention and reinsurance, faculative and treaty different types of treaties.

5. Office organisation and routine, field organisation and salesmanship.

6. Insurance company accounts, special records, expense ratio, annual returns, taxation of insurance profits.

7. Insurance Act of 1938 and Rules 1939.

8. State and insurance, social security, Employees State Insurance Corporation, general objects of Life Insurance Corporation.

Paper II—**Insurance Life, Fire, Marine and accident**

A. life, purpose and scope of life policies, various types of policies and their special uses, annuity group, procedure to effect policies, application of the legal principles, prospectus proposal, reports, classification of risks, selection, Extra risk, policy and conditions, automatic nonforfeiture, assignment, nomination, title, settlement.

Common diseases, their causes, effect on longivity underwriting of substandard lives, lien reinsurance, premium elements, compound interest, mortality tables, annuity rates loading, valuation, distribution of profits, general treatment.

Investment of life fund.

Provisions of 1938 Act and Rules 1939 relating to life insurance, Life Insurance Corporation Act, 1956 and rules.

B. Fire, marine, personal accident, motor, employee's liability, guarantee, aviation, burglary, etc.

Application of general, legal principles, kinds of policies and their uses, procedure in issuing policies, proposals, cover note, slip, reports, policy terms and important conditions, endorsements, settlements of claims, reserve for unexpired risk renewal receipts.

Provisions of 1938 Act and Rules relating to general insurance.

Books Recommended :

1. Dinisdal : Elements of Insurance (Pitman.)
2. P. A. S. Mani : Life Insurance in India (Hindustan Advertisers, Bombay.)
3. Dr. R. M. Ray : Life Insurance in India (Allied Publishers, Bombay.)
4. Sarma : Insurance in India (Vora Company).
5. Gosh and Agarwal : Principles, Practice and Law of Insurance.
6. National Planning Committee : Insurance.
7. Insurance Act, 1938 and Rules 1939.
8. Life Insurance Year Book.
9. Tam : A Guide to Life Assurance.

10. Venkoba Rao : Insurance Law in India.

11. Young and Bacon : Principles and Practice of Life Assurance.

12. Welsen and Taylor : Insurance Administration (Pitman.)

13. Smith : Marine Insurance.

14. Banfied : Accident Insurance (Pitman.)

15. Sprage and Sprague : Insurance Company Accounting.

16. Godwin : Fire Insurance.

(*c*) CO-OPERATION

PAPER I

HISTORY AND PRINCIPLES OF CO-OPERATION

Philosophy of co-operation, co-operation as a principle, meaning and scope of co-operation, its genesis and development, brief history of the movement in Europe, the U.S.A. China and Japan.

History of co-operation in India. Ancient Indian institutions, beginning of modern movement, evolution since 1904, progress in various states since independence, place of co-operation in the five year plans, government's role in promotion and regulation of the co-operative institutions, departments and ministries at state and union levels, the co-operation.

Structure co-operative institutions of various types and at various level, objectives : functions and working of the various types of co-operative institutions, credit or multi-purpose or service society at the village level, both of small and large size : District Central Co-operative.

Urban credit societies, salary earners co-operative societies, urban banks, state co-operative bank ; primary co-operative marketing society and purchase and sale union, district marketing union state marketing federation, All India Co-operative Marketing Federation, industrial co-operatives ; housing co-operatives ; consumers' co-operatives, primary and central land mortgage banks ; processing societies ; milk supply societies and union.

Evaluation of the movement in India, its achievements, handicaps and weaknesses, re-organisation of the movement in India, Reserve Bank's efforts, constitution and working of the agricultural credit

department of the Reserve Bank of India, its role in the sphere of agricultural credit. State Bank of India, finance for marketing and processing, future of co-operation in India.

PAPER II

CO-OPERATIVE LAW AND PRACTICE

Main features of the co-operative law in principal foreign countries, origin and history of co-operative legislation in India, a detailed study of the Co-operative societies acts of 1904 and 1912.

Formations, registration and organisation of different type of co-operative societies, conditions of registration, Certificates of registration, limited and unlimited liability membership, general body, managing committee, model bye-laws amendment of bye-laws.

Borrowing of funds as loans and deposits from members and non-members, security for loans.

Investment of funds in and outside the business, restrictions on the decision of profits, reserve funds charitable funds, dividend, bonus remuneration, etc. accounts pertaining to co-operative societies, books and accounts to be maintained, difference between double entry and the system in vogue in co-operative societies.

Audit and inspection, distinguishing features of audit, supervision, inspection and enquiry scope of co-operative audit, who is responsible for audit, who can audit, important points in audit reports, responsibilities of auditors, audit certification, audit fee, audit memo, rectification report, inspection, scope of inspection, who can inspect a society, preparation of inspection notes, issues of inspection, memo, enquiry into the constitution, working and financial condition of a society.

Supersession and dissolution of managing committee, disputes under co-operative law, how tofile a dispute, who can decide a dispute, bar of jurisdiction of civil courts, review, appeal and revision of award.

Liquidation, cancellation of registration, concession granted to registered societies, exemption from compulsory registration of documents, remission of income-tax on profits, exemption from registration fees and stamp duty on documents relating to business of societies.

Organisation of the co-operative department powers of the Registrar.

Group C

OPTIONAL :

(*d*) INCOME-TAX LAW AND PRACTICE

PAPER I—INCOME-TAX LAW

1. General principles of taxation.
2. Definition of terms in the Income-tax Act—Act 43 of 1961—income, agricultural income, earned income, assessee, previous year dividend, etc.
3. Basis of charge, residence, income, income which does not form part of total income.
4. Various classes of assessees, computation of total income heads of income, salaries, interest on securities, income from house property, profits and gains of business or profession, capital gains, income from other sources.
5. Method of accounting.
6. Income of other persons included in assessee's total income, set-off loss and carry forward of loss, income forming part of the total income on which no income-tax is payable.
7. Rebates of income-tax and relief from income-tax.
8. Income-tax authorities, jurisdiction and powers.
9. Procedure for assessment, reopening of assessments rectification of mistakes.
10. Special provisions applicable to firms, assessment of firms, registration of firms, changes in constitution of firms.
11. Deduction of tax at source, advance payment of tax.
12. Current Finance Act.

PAPER II—INCOME-TAX PRACTICE

Questions on theory and simple problems on computation of income under various heads and total income, computation of tax thereon, application of rates, short note question.

Recommended :

Government of India Publication : Income-tax Manual.

Iyengar, A. C. Sampath : Indian Income-tax Act.

Sundaram V. S. : Income-tax Act.

Kanga, J. B. and Palkhivala : Income-tax Act.

Iyer, A. N. : Income-tax Act.

Indian Income-tax Report.

Lakhtia R. N. : Elements of Indian Income-tax (latest edition).

Rup Ram Gupta : Income-tax Law & Practice (latest edition).

CHAPTER XLVIII

DEGREE OF BACHELOR OF BUSINESS ADMINISTRATION (B.B.A.)

(THREE YEAR DEGREE EXAMINATION)

Regulations

Conditions of Admission

1. (*a*) Candidates for the degree of Bachelor of Business Administration should have passed the Pre-University Examination of this University or an Examination accepted by the Syndicate as equivalent thereto having secured at least a minimum average of 'B' Grade or 50% marks in the Pre-University Examination or the Examination accepted as equivalent thereto.

(*b*) A candidate may be asked to withdraw from the course at any time during or at the end of the first term, if in the opinion of the Head of the Institution or Department, the candidate is not likely to be benefited from the course and such decision will be final.

(*c*) During the period of the duration of his studies, the candidate must abide by the rules and regulations.

Application for Admission

2. (*a*) Application for admission to the Course must be made in the prescribed form obtainable at the office of the affiliated institution not later than the date notified each year.

(*b*) The admission will be subject to interview.

3. (*a*) Every candidate for the Degree shall, besides undergoing the prescribed course of instruction, will do practical work by way of case study, term reports, factory visits, etc. under the guidance of his instructor and to the satisfaction of the Head of the Department or Institution, and shall be required to maintain a record.

Eligibility for the Degree

(*b*) No candidate shall be eligible for the Degree unless he has completed the prescribed course of study in an affiliated institution and has passed the prescribed examinations.

(*c*) No candidate shall be admitted to the examination unless he has attended not less than 75% of the total attendance at lectures and class sessions and has produced a certificate from the head of the affiliated institution where the candidate has studied, certifying that his progress and conduct have been satisfactory.

4. The B.B.A. Course is divided into three parts, each of a duration of one academic year or three terms. Parts I and II consist of foundation courses to be completed in two academic years or six terms ; and Part III consists of application courses.

Duration of the Course

5. Lectures shall be supplemented by case study, role-playing, and conference or seminar methods of discussion, factory visits, preparation of term-papers etc. in accordance with the nature of the subject, with a view to enable the candidates for the degree to participate in the analysis and solution of problems of business enterprises.

Methods of Study

6. The subjects of study for the Degree shall be as follows and in accordance with the syllabi prescribed :

Course of Study

PARTS I AND II — **Foundation Courses**

PART I

Paper 1. Business Communication and Reports I

,, 2. Economic Analysis

,, 3. Social Environment of Business

,, 4. Elements of Statistical Method

,, 5. Industrial and Social Psychology

PART II

Paper 1. Business Communication and Reports II

,, 2. Business Administration

,, 3. Business Law

,, 4. Money, Banking and Trade

,, 5. Financial Accounting and Cost Accounting

,, 6. Elements of Business Mathematics.

PART III—**Application Courses**

PART III

Paper 1. Economic Planning and Development

,, 2. Manufacturing Analysis and Workstudy

,, 3. Marketing Management.

,, 4. Corporate Structure and Finance

,, 5. Written Analysis of Cases

7. *Scheme of Examinations :*

(i) The scheme of examinations shall be as follows :

PART I

	Hours	Marks for the Sessional Work	Final Examination Marks	Total	Minimum Passing Marks
At the end of the First Year :					
Paper 1. Business Communication and Reports I	3	25	75	100	40
,, 2. Economic Analysis	3	25	75	100	40
,, 3. Social Environment of Business	2	—	50	50	20
,, 4. Elements of Statistical Method	3	25	75	100	40
,, 5. Industrial and Social Psychology	2	25	75	100	40
At the end of the Second Year :					
Part II					
Paper 1. Business Communication and Reports II	3	25	75	100	40
,, 2. Business Administration	3	25	75	100	40

		Hours	Marks for the Sessional Work	Final Examination Marks	Total	Minimum Passing Marks
Paper	3. Business Law	3	25	75	100	40
,,	4. Money, Banking and Trade	3	25	75	100	40
,,	5. Financial Accounting and Cost Accounting	3	25	75	100	40
,,	6. Elements of Business Mathematics	2	—	50	50	20

PART III

At the end of the Third Year:

Paper	1. Economic Planning and Development	3	25	75	100	40
,,	2. Manufacturing Analysis and Workstudy	3	25	75	100	40
,,	3. Marketing Management	3	25	75	100	40
,,	4. Corporate Structure and Finance	3	25	75	100	40
,,	5. Written Analysis of Cases	3	25	75	100	40

(ii) There will be an examination at the end of each Part at the end of the year.

8. (i) A candidate shall be declared to have passed the examination if he secures not less than 40% of the marks in each paper.

(ii) (*a*) No candidate will be allowed to take up the final examination unless he has completed the Sessional Work by 31st March every year to be held in March/May.

(*b*) Marks for Sessional Work secured by the candidate in the first instance will continue to be added to his final examination marks in the papers in which he has failed in the first attempt and is allowed to clear in subsequent attempts.

(iii) (*a*) A candidate who secures not less than 60% of the aggregate marks in all the three parts shall be placed in the First Class.

(*b*) A candidate who secures not less than 50% of the aggregate marks, but less than 60% of the aggregate marks, will be placed in the Second Class.

(*c*) A candidate who secures not less than 40% of the aggregate marks, but less than 50% of the aggregate marks, will be placed in the Third Class.

9. Statement of marks shall be furnished.

DETAILED SYLLABI

PART I

BUSINESS COMMUNICATION AND REPORTS I

Objective : The purpose of this subject is to enable the candidate to develop his communication skills in English, to express himself with clarity and effectiveness, to acquire ability to participate in and conduct conferences and small meetings, and to draft business communications.

In Part I, to be taught in the First Year, he should be able to learn sentence structure and construction, paragraph building, summarising and precis writing for the purpose of business correspondence and internal communications.

In Part II, to be taught in the Second Year, he should be able to accumulate a vocabulary for expressing routine ideas and concepts of business. In addition, he would be given practice in being able to draft minutes and proceedings meetings of committees and boards as well as preparation of short reports resulting from investigations, studies and surveys related to business topics.

Syllabus

1. BUSINESS COMMUNICATION AND REPORTS I

External Communications : Practical application of good letter form and effective communication principles to business situations—letters to customers : Replies to customers' letters of enquiries, Tenders, Quotations, Claims ; complaints pertaining to products, delivery, accounts, Letters to Banks, Insurance Companies, Transport organisations such as railways and roadways, Government departments, Trade Associations and Chambers of Commerce, and Labour Unions.

Internal Communications : Inter-departmental communications pertaining to gathering and furnishing information, requisition for supplies and facilities, maintenance and house keeping, security arrangements, drafting short reports and explanations for superiors, writing job instructions to subordinates, warning notes and charge sheets, merit rating and personnel appraisal reports. Importance of listening and non-directive interviewing in upward communication.

Communication media : Costs and comparative merits of oral and written media, intercom apparatus, telegrams, telephones, and telex.

Oral Communications: Introductory knowledge and consideration in dealing with members of public, face to face as well as on telephone, with a view to build up company image with the outside world—role of courtesy and business etiquette.

SUGGESTED BOOKS FOR READING

BUSINESS COMMUNICATION AND REPORTS I & II

Kindilien, C. T.	.. Technical writing and communications. (National Foreman's Institute 1963)
Nelson, L. F.	.. Commercial Correspondence and Commercial English (Pitman)
Nagauka, Hiromu and Theophelus, D.	.. English and Commercial Correspondence (Pitman)
Holl, F.	.. First steps in business letter-writing (Pitman)
Skelton	.. Higher Business Correspondence (Pitman)
Fry, R.	.. Manual of Commercial Correspondence (Pitman)
Stephenson, J.	.. Principles and Practice of Commercial Correspondence.
Aurner, R. R.	.. Effective Business English.
Wachner, C. W.	.. English III (Holt, advanced series, Holt Rheinhart and Winston—1964)
M. M. C. School of Management	.. Over the Telephone, Etiquette and Efficiency.
Punk, V. & Lewis, N.	.. 30 days to a more powerful vocabulary (Wilfred Funk Inc., N. Y.).
Straus, G. & Sayles, L. E.	.. Personnel, Human Problems of Management (Chapter 9).

2. ECONOMIC ANALYSIS

Objective : To give a working knowledge of the basic concepts of Economic Science with particular reference to industry and commerce.

Syllabus :

1. Nature and significance of economic science—Economics and Technology—Utility of economics in Business Management and Industrial Administration.

2. Importance of concepts—Analysis of demand and supply—Law of Diminishing Utility—Indifference curves—Concept of Elasticity of Demand—Importance of Marginal Principle in Economic action—Laws of costs—Importance of increasing returns in industrial activity—Concept of elasticity of supply—Forces governing the supply of factors of production—Land, labour and capital and enterprise.

3. Theory of the firm under static and dynamic conditions—The problem of price fixation—The role of supply and demand—concepts of rent and quasirent—Equilibrium analysis, partial and general—Concept of normal profits—The representative firm—Price fixation under conditions of monopoly—Oligopoly and bilateral monopoly—Economics of bulk purchases.

4. Theory of distribution—The principle of substitution and marginal productivity theory—Effects of economic institutions on distribution—Trade unions and wage rates—Distribution and economic progress.

5. Methods of obtaining finance internal and outside sources—Industrial Finance Corporations—State finance bodies—The problem of working capital—Relationship of the business units with banks.

Suggested Readings :

Benham	..	Economics.
Meyers	..	Elements of Modern Economics.
Samuelson, Paul, A.	..	Economics.
Cairncross	..	Introduction to Economics.
Dewett	..	Modern Economic Theory.

PART I

3. SOCIAL ENVIRONMENT OF BUSINESS

Objective : The purpose of this subject is to create a capability in the student for an awareness of the major external forces affecting business firms, opportunities of growth in the context of Indian economic growth in its various sectors, and the social changes that will accompany economic development.

Political Environment : Parliamentary democracy and socialistic pattern of society—Role of political parties—Leadership succession—Directive principles of the state.

Economic Environment : Business opportunities and entreprenuership—Planned development and potential for the growth of individual industries and firms in the long range, both for internal and external markets. Fiscal, industrial and labour politics of the state and their impact on business—Elementary conepts of business cycles and managerial adjustments to meet them.

Social Environment : Cultural background—Caste and communities, joint family system—Linguistic and religious groups and national integration—professions and the community—literacy standards and education—population changes and population migration—problems of urbanisation standards of living—income groups—impact of foreign culture—changing social values—progress and stability.

Suggested Readings :

Farmer, R. N. and Richman, B. M.	..	Comparative Management and Economic Progress (Chapters 1, 2, 7, 8 and 10 of 1962 Edition)
Pylee, M. V.	..	India's Constitution (Chapters 1, 2, 3, 7 and 16)
Srinivasan, K.	..	Productivity and Social Environment (Chapters 1 to 6)
Sharma and Chauhan	..	Indian Industries (Chapters 4, 5, 6 and 12)
Government of India	..	Five Year Plans (Summaries only)
Eells, R. and Walton, C.	..	Conceptual Foundations of Business (Chapters 18, 19, 20, 21 of 1961 Edition).

4. ELEMENTS OF STATISTICAL METHOD

Objective : This is an introduction to show how simple statistical methods can be applied to business situations, so as to assist the manager in assessing the significance of data available from external and internal sources. The study is directed not so much towards the theory of statistics as towards the utilisation of statistical techniques in practical situations.

Syllabus :

Nature and scope of statistical methods—Statistical measure and methods of expression of devices making possible the measurement, classification and summation of data so as to clarify their inplications—Application of statistics to business and industrial activities.

Collection of data—Primary and secondary data—Sources of secondary data—considerations to be borne in mind in the use of secondary data—Methods of collecting primary data—Census *vs* sample —Agents *vs* mail questionnaires—Preparation of questionnaires and schedules—Editing schedules, Preliminary tabulation.

Methods of selecting a sample—Random sample— Stratified sample—Purposive sample—Simple application of sampling to problems in commerce and industry.

Presentation of data—Tabular forms—Methods of classifying data—Summary tables and reference tables—Construction of tables.

Graphic presentation—Construction of charts—Bar charts—Pre-diagram—Line graphs—Ratio Charts —Pictograms—Graphics as applied to budgeting—Comparison of target figures with actual performance data.

Frequency distributions—array—Construction of frequency distribution—Graphic presentation of frequency distributions—the histogram, frequency polygon and the frequency curve. Cumulative frequency distributions and the ogive—Types of frequency distributions.

Measures of central tendency—Mean—Median Mode—Geometric mean—Harmonic mean—Characteristics of different measures —Application of averages in business—Limitations of the measures.

Dispersion—Purpose of measuring dispersion—Range—Quartile deviation—Mean deviation—Standard deviation—Relative measures of dispersion—Coefficient of variation—Skewness—Use of measures of dispersion and skewness.

Simple correlation and regression.

Index numbers—Meaning of index numbers—Uses of index numbers in the study of economic and business problems—Types of index numbers—Methods of constructing index numbers, study of some index numbers in current use.

Time series—importance of time series analysis in studying business changes—Four distinct movements in time series—secular trend—Seasonal variations—Cyclical fluctuations and erratic movement.

Secular trend—Nature of trends—Methods of trend fitting—Free hand curves—Methods of semi averages—Method of moving averages. Method of least squares—Elimination of trend.

Seasonal variation—Methods of measuring seasonal variation—Method monthly totals or monthly averages—Ratios to trend method—Ratios to moving average method—Changing seasonal variation—Use of seasonal indexes—Eliminating effects of seasonal variation.

Cyclical and erratic movements—Phases of cycles—Length of cycles—Nature of erratic movements—Cycles measured from "normal"—Comparing cyclical relationship between different series—Significance of irregular residuals.

Business forecasting—Object of forecasting—Short-term and long-term forecasting—Methods of forecasting—Use of basic indicators—Business barometers—Use of time series analysis—Use of correlation analysis—Limitations of forecasts and of statistical analysis in forecasting.

Statistical Quality Control—Types of variations in quality—Elementary ideas regarding control charts for variables and attributes—acceptance sampling and other techniques.

Preparation of statistical reports—Use of statistics in business organisation.

Suggested Readings :

Croxton & Cowdon	..	Practical Business Statistics
Hanson	..	Managerial Statistics
Asthana	..	Elements of Statistics
Neiswanger, W. A.	..	Elementary Statistical Method.
Rice, W. B.	..	Control Charts in Factory Management (John Wiley, 1955).
Bajpai		Foundations of Statistics (Asia, 1967).

5. INDUSTRIAL AND SOCIAL PSYCHOLOGY

Objectives : This paper is intended to give the students an introduction to science of human behaviour as a foundation to a knowledge of the art of handling men as individuals and group members in a working situation.

Syllabus :

Nature, scope and methods of modern Psychology—relation with other sciences, the role of behavioural sciences in management. Psychology of attention, perception, motivation, learning and retention. Psychology of individual differences—intelligence, aptitude, interest, attitude, temperament and other personality variables, Application of psychology to trade tests and techniques in personality measurement.

The nature of work—Job analysis, Job specification, Job Evaluation and wage administration ; vocational selection and vocational guidance—Psychology as applied to industrial training and the adaptation of the individual to the task. Human engineering—man-machine system.

Effects of noise, temperature, ventilation and illumination on efficiency and productivity—the Hawthorn experiments.

Accident and safety problems—Psychological factors— safety procedures.

Motivation of the employee—Need satisfaction and incentives. Types of incentives—social factors involved.

Merit rating and appraisal—importance, proficiency indices, methods, guidance and counselling.

Psychology of the social group—psychological differences between group and individual behaviour—industrial and commercial organisations as social systems—Resulting psychological problems—Formal and informal groups—group processes—individual roles and relationships within group with special reference to industrial setting.

Morale and leadership—psychological bases of morale—determinants of morale—methods of increasing morale in Industry—leadership functions—leadership types—training in leadership.

Organisation changes and the individual—conflicts in industrial organisation and their resolution.

Social change—impact of technology on institutions

(*a*) *Suggested Readings :*

1. Industrial Psychology by Tiffin, J. and McCormick (Asia).

2. Social Psychology by Bonner, H. (Eurasia Pub. House, New Delhi).

3. Managerial Psychology by Leavitt (University of Chicago Press).

4. Industrial Psychology by Harrel (Oxford Book Co., Calcutta).

(*b*) *References :*

1. Psychology—The Fundamentals of Human Adjustment by Munn, M. L.

2. Industrial Psychology and its Social Foundations by M. L. Blum (Harper & Row).

3. Psychology of Industrial Relations by C. H. Lawshee (McGraw Hill).

4. Psychology of Industrial Conflict by Stagner, Ross.

5. Leadership, Psychology and Organisation by B. M. Bass (Harper International, 1960).

6. Personnel and Industrial Psychology by Ghiselli, E. E. & Brown, C. W.

7. Social Psychology by Asch (Prentice Hall).

PART II

1. BUSINESS COMMUNICATION AND REPORTS II

Syllabus :

Written communications other than commercial and trading correspondence ; memos, notes, reports—Format and presentation of Report—organisation and preparation of effective reports.

Market Reports—Terminology, interpretation of commodity and stock market reports—practice in writing simple market reports.

Reports for internal use—organisation of the report—key considerations in routine reports on investigations related to business conditions, products, competition, monthly reports on working of departments, branch offices, labour conditions, materials, accounting matters, Surveys related to business prospects, etc. Secrecy considerations—timing of reports.

Communications pertaining to business meetings,—preparation of notices, agenda, proxies, motions, resolutions, and minutes. Annual reports to shareholders, Problem-solving conferences. Problems of communication failure and breakdown—managerial control o communication.

Additional suggested readings of topics from :

1. Business Communications, Principles and Methods by Heinstreen and Betty (Wadsworth Publishing Co., Belmont, California).

2. Management Writing Guide by Lawrence D. Brennen, National Foremen's Institute (Prentice Hall).

3. Problem-solving discussions and conference by Norman R. F. Maier (McGraw-Hill) Chaps. 4, 5 and 6.

4. Market Reports by Lorenzo. (Kitab Mahal 1969).

5. Secretarial Practice in India by J. C. Bahl (N. M. Tripathi Pvt. Ltd., Bombay).

2. BUSINESS ADMINISTRATION

Objective : The purpose of this paper is (*a*) to acquaint the student with the fundamental *concepts* of Business Administration in so far as they have been built up into a body of knowledge and (*b*) to provide him with a general frame-work within which practical situations arise in conducting the internal affairs of a business enterprise. Case Method is to be introduced and detailed techniques or their applications are not to be emphasised.

Syllabus :

Definition and history of business, business opportunities and risks, leadership in business and industry—factors governing optimum size—general features of different legal forms of enterprise—Nature and scope of business administration and management.

Development of general theory of administration and organisation—contributions of Taylor and his associates, Fayol, Mooney and Reilly, Urwick, Hopf, Owen, Towne, More recent concepts developed by the works of Elton Mayo and his associates ; Mary Parker Follet, Chester Barnard, Douglas McGregor and other behavioural scientists. Aids from quantitative sciences. Systems approach to management—Schools of Thought—Management by Objectives.

Elements of business administration and management : forecasting, planning and decision-making ; managerial staffing and organising—structure, authority, delegation and decentralisation of structure-line and staff relationships, committees ; staffing ; motivating and leading ; direction, coordination and communication ; controlling and control methods. Pert and *CPM*.

Functional areas of business : organisation, routines, procedures, and problems in production, marketing, finance, and personnel. Co-ordination of functions ; O and M ; office administration.

Human factor in administration—Policies and general framework governing the procurement, development, and maintenance of human resources in an enterprise. Motivation, Morale, Productivity, Employer-Employee and management-union ralations.

Social responsibilities of business community—Professionalisation of management—Appraisal of managerial quality and performance. Business Image in India.

Trends in the management of business enterprises.

(*a*) *Suggested Readings :*

1. Business Administration by Morris Hurley (Prentice Hall, India).

2. Administrative Action by William H. Newman (P-Hall or Pitman).

3. Professional Management by Theo Haiman (Eurasia, New Delhi).

4. The Ground Work of Management by Asthana (Shivalal Agarwala, Agra).

5. Business Organisation and Industrial Management by S. R. Davar (Progressive, Bombay 1969).

(*b*) *References :*

1. Business Administration by Arthur W. Weimer (Richard D. Irwin).

2. Business Administration by M. Bannerji (Asia).

3. Business Administration and Management by S. C. Saxena (Sahitya Bhawan).

4. Personnel Management by Flippo (McGraw-Hill).

5. Office Management by Denyar (McDonald and Evans).

6. Readings in Management by Richards M. D. and Nielander W. A. (Taraporevala, Bombay).

7. Trusteeship by M. K. Gandhiji (Navajeevan Press, Ahmedabad).

3. BUSINESS LAW

Objective : To provide students with a broad base of knowledge about legal aspects of commerce, trade and industry and in dealing with employees. The treatment should be as far as possible from a managerial rather than legal point of view.

Syllabus :

Introduction : Definition of Terms, statute and non-statute law, civil and criminal law.

Contract : Definition, classification—essentials of a contract, mistake, misrepresentation and fraud—rights and obligations of parties—contracts not enforceable, assignment, breach, performance and discharge.

Agency : Nature, class of agents, appointment, termination, rights and duties and liabilities. Relations with third parties—Types of agents.

Sale of goods : Definition, price, seller, formalities, acceptance and receipt, conditions, and warranties. Rights and remedies in case of breach. Lien and stoppage in transit. Transfer of property.

Partnership : Definition, creation, essentials relations with partners *inter se* and to third parties. Liabilities of partners, dissolution, goodwill, limited partnership.

Companies : Formation, kinds of companies, memorandum and articles of association, rights and liabilities of members. Shares and debentures—Liquidation.

Negotiable instruments : General characteristics. Bills of Exchange, Negotiation, endorsement, forgery, dishonour, noting and protesting liabilities of parties, payment for honour, discharge, bills in sets, cheques, promissory notes, bank notes.

Law of Insolvency : Acts of insolvency petition, receiving adequate subsequent proceedings, discharge. Debtors' property and duties, appointment, powers of O. R. and O. A. Duties and powers of Court.

Industrial Relations Law : General acquaintance with main provisions and salient features of laws relating to workmen's compensation, hours of work, safety, health, wages, protection of women and young persons, trade unions and industrial disputes.

Suggested Readings :

1. Indian Mercantile Law by S. R. Davar (Progressive, Bombay).
2. Mercantile Law by Venkatesan, E. (E. V. Bhagiratha Rao, Madras, 1963).
3. A Manual of Indian Companies Law and Practice by S. R. Davar (Progressive).
4. Acts : Factories Act, Workman's Compensation Act, Trade Union Acts, Industrial Disputes Act.

4. MONEY, BANKING AND TRADE

Objective : To give the student a working knowledge of the basic concepts of economic science in so far as they relate to money, banking, trade and transport and as applied to industry and commerce.

Syllabus :

Money and its role in modern society—money supply and its measurement value of money, meaning and measurement. Theory of money and price level. Inflation and deflation ; Monetary system. Objectives of monetary policy. Trade cycles. Fluctuations in income and employment.

Functions of banks. Investment of resources by banks : Banking facilities to business, agriculture, small entrepreneurs ; Banking

systems—Central Banks. Methods of credit control. Present monetary systems of India—Monetary policy of the Reserve Bank of India.

Salient features of trade in India. India's foreign trade since 1967. Chief imports and countries of origin. Indian exports and their destinations, Fiscal measures in relation to foreign trade. Foreign exchange, balance of payment and exchange control. Licensing procedures—Export Promotion—incentives and subsidies—state trading.

Transportation system of India. Cost of transport by rail, road, air, sea and inland Waterways. Concepts in rate setting, Relative costs of each—rail *versus* road transport. Land transport *versus* air-freight—India's coastal shipping. Despatching and shipping procedures and forms.

(a) *Suggested Readings :*

1. An outline of Money by Crowther.
2. Modern Banking in India by Muranjan.
3. Recent Banking Developments by S. K. Basu (Book Exchange, Calcutta).
4. Transport by K. P. Bhatnagar & others (Kishore Publishers, Kanpur).
5. Structural Basis of India's Foreign Trade by R. Bhardwaj (Allied Publishers, Bombay, 1963).
6. State Trading in India by Laxmi Narayan.

(b) *Reference :*

Journal of Industry & Commerce (Government of India).

5. FINANCIAL AND COST ACCOUTING

Objective : The subject is intended as an introduction to accounting principles and procedures. It does not require a fully detailed treatment such as would be given in an accounting course. The purpose of its study is to acquaint the student so as to enable him to use and interpret all forms of accounts with a knowledge of principles underlying the compilation of accounting statements and reports.

Syllabus :

Definition of " account ". The nature, objects, and utility of accounting in industrial and business enterprises. Books of accounts. The theory of double entry book-keeping and the structure of the resulting accounting system. Other system of book-keeping. The application of mechanised methods of accounting ; modifications to the system necessitated and the consequent modifications to the system.

Statements of accounts : Manufacturing Accounts ; Trading Accounts ; Profit and Loss Accounts and Profit and Loss Appropriation Accounts. The Balance Sheet and the various forms it may take. Revenue Account ; Income and Expenditure Account ; Receipts and payments Accounts. Capital and Revenue, Depreciation and Depreciation Funds ; Reserves and Provisions. The interpretation of statement of account.

Internal auditing ; the clear planning of the audit. The checking of stocks ; Stock taking and perpetual inventory.

Purposes and utility of costing, Elements of cost ; materials, labour, chargeable expenses and overhead charges, other terms in general use. The different systems of costing, their principal features ; and relative suitability for various types of production and extractive industries. The principles of standard costing ; its relation to budgetary control, Estimating and its relation to costing ; price fixation. Cost information as a tool of management. The relationship of financial accounts to cost accounts ; reconciliation between them. Graphic presentation.

The receipt, issue and pricing of stores. Flow-in of materials and flow out of finished product. Preparation of wage records, calculation of incentives, Labour costs and their relation to wage records.

The organisation of accounts, costs and wage departments and their relations with other departments.

Accounting as a tool of managerial decision-making. Budgetary control as an extension of the foregoing to all the activities of an enterprise. The principles of Budgetary Control ; relating budgets to areas of responsibility : building up budgets from the bottom upwards. Application of Budgetary control and variance analysis to the control functions and formation of policy.

Suggested Readings :

1. Cost Accounting by Wheldon.
2. Practical Auditing by Spicer and Peglar (Allied Publishers Pvt. Ltd., Madras).
3. Double Entry Book-keeping by J. R. Batliboi (The Standard Accountancy Publications Pvt. Ltd., Bombay).
4. Budget Principles and Procedures by Bartizel (Prentice Hall).
5. Management Accounting by N. Sarkar (Academic Publishers, Calcutta).
6. Principles of Accounting (Intermediate) by Finney H. A. and Miller H. E. (Prentice Hall).
7. Business Budgets and Budgetary Control by Willsmore (Pitman, 1960).

6. ELEMENTS OF BUSINESS MATHEMATICS

Objective : The subject seeks to develop ability of the students to utilise mathematical methods and principles as tools in solving managerial problems. It does not require a fully detailed treatment as would be given in a Mathematics Course.

1. *Elements of coordinate geometry :*

Syllabus : The rectangular coordinate system—The slope—intercept form of the equation of a straight line. The graph of the equation $Y = a^2 + b^2 + c$—Interpretive problems.

References :

Relevant portions in

Chapter 1 and Appendix 2 in (1)

Chapter 5, Part I in (2)

Chapter 5 & 6, Part II in (3)

Chapter 1 in (4)

Note :—The references in ( ) above are from the Book List provided for Elements of Business Mathematics.

2. *Sets and Basic Operations on Sets :*

Syllabus : The notion of a set—Subset and set equality—Venn diagrams—Basic Operations on sets : Union, intersection, complement and set difference.

References :

Relevant portions in

Chapter 2, Part I in (2)

Chapter 1, Part I in (3)

Chapter 8 in (5).

3. *Functional representation :*

Syllabus : The concept of function—Functional representation of simple Business situations.

References :

Relevant portions in

Chapter 3, Part I in (2)

Chapter 6, Part II in (3)

Chapter 1 & 6 in (4)

4. *Elements of the theory of sequences and series :*

Syllabus : Arithmatic and geometric series—Concept of a limit—Limit of a function—Continuity of a function of a single variable—Convergent and divergent series—Comparison test and ratio test (*without proof*)—Power series—Interval of convergence for standard power series—Exponential function—Elementary problems only.

References :

Relevant portions in

Chapter 4 & 5, Part I in (2)

Chapter 11, Part IV in (3)

Chapter 2 in (4).

5. *Differential Calculus :*

Syllabus : The derivative of a function—Marginal interpretation of the derivative—Differentiation rules : Sum rule, product rule,

quotient rule and function of a function rule, Differential coefficients of functions which normally occur in business situations—Taylor's Theorem (Statement only)—Criteria for maxima and minima (Single variable case only).

References :

Relevant portions in

Chapter 9 & 10 in (1)

Chapter 6, 7 & 8 Part in (2)

Chapter 11, Part IV in (3)

Chapter 2, 3 & 4 in (4)

Chapter 6 in (5)

6. *Simple applications of these concepts to deterministic business models :*

Syllabus : Simple applied problems in maxima-minima : Fencing problems container dimensions, simple advertising budget problems, Finding the minimum cost lot size (instantaneous production, no shortage), determining optimum where-house territories, simple marketing models, Equipment replacement and maintenance problem.

References :

Relevant portions in

Chapter 9 in (1)

Chapter 9, Part II in (2)

Chapter 13, Part IV in (3)

Chapter 5 in (4)

7. *Methods of Integral Calculus :*

Syllabus : Antiderivatives and the indefinite integral—Elementary integration formulae—rules of integration—the definite integral—area interpretation of the definite integral simple problems involving integrals of functions which normally arise in business situations.

References :

Chapter 11 in (1)

Chapter 12, sec. 2, 3 in Chapter 13, Part IV in (3)

Chapter 8 in (4) and Chapter 6 in (5).

8. *Simple applications of elementary ordinary differential equations :*

Syllabus : Simple first order, first degree ordinary differential equations :—(1) Variable separable, (2) Linear.

References :

Relevant portions in

Chapter 11, Part II in (2).

9. *Matrices :*

Syllabus : Definition and notation—addition of matrices—multiplication of a matrix by scalar—product of matrices matrix inversion—solutions of linear equations—Gauss Jordan method of testing the consistency or otherwise or a system of linear equations.

References :

Relevant portions in
Chapter 2 & 6, Part I in (1)
Chapter 13, Part IV in (2)
Chapter 9, Part III in (3)
Chapter 7 in (5)

Book List for suggested readings in Elements of Business Mathematics :

(1) Earl K. Bowen — Mathematics with Applications in Management & Economics (Richard D. Irwin, Inc. 1963).

(2) Burton V. Dean, Maurice W. Sasieni, Shiv K. Gupta — Mathematics for Modern Management (John Wiley & Sons, 1963).

(3) Chris A. Theodore — Applied Mathematics—An Introduction Mathematical Analysis for Management (Richard D. Irwin, 1965).

(4) James E. Howell & Daniel Teichroew — Mathematical Analysis for Business Decisions (Richard D. Irwin, Inc. 1963).

(5) Springer, Herlihy & Beggs — Basic Mathematics : Vol. 1 (Richard D. Irwin, Inc. 1965).

1. PLANNIG AND DEVELOPMENT

Objective : The purpose of this course is to provide the student with the knowledge of the working of our national economy and with the objectives and methods of India's recent system of organising development through Five Year Plans. The approach to this paper should be analytical rather than descriptive.

Syllabus :

Introduction to the study of the process of economic development. The effect of physical and social environment upon economic organisation of societies. Fundamental problems of under development.

India's Industrial Resources : A critical study of the distribution of India's resources : agricultural, plantation and forest wealth, fisheries ; minerals—iron ore, coal, mica, manganese, petroleum and earths ; water and sea ; power and energy ; cattle ; Human resources—distribution and composition of population ; manpower development ; transportation system ; major manufacturing industries in India's economy—textiles, metallurgical and engineering, cement, glass, petro-chemicals, chemicals, agro-industries, animal industries. Handicrafts and cottage industry. Other elements of infra-structure of growth.

National Income : Sectoral distribution of national income. National Income and its measurement in India. Standard of living.

Public Finance : Financial system of the Indian Union, resource mobilisation, implications of deficit financing, and foreign aid ; public debt.

Economic Issue in India : Land Policy, agricultural finance, price support and policies, food problem : production, demand distribution ; Industrial Finance ; Labour problems : wages, housing, training in skills, trade unionism ; industrial disputes ; labour productivity in India. Changing pattern of foreign trade.

Planning : Importance and objectives of planning for the economic development of India. Salient features and provisions of the plans, priorities, targets. Financing the plans : physical and financial resources, capital formation, savings and resource mobilisation taxation, government borrowing ; role of foreign capital. Public Sector. Cooperatives.

Planning machinery : A critical review of planning and plan implementation of the plans in India since 1951.

(a) *Suggested Readings :*

1. Economic Geography by A. Dasgupta (Mukherji & Co., Calcutta).

2. A New Approach to Economic Geography : A Study of Resources by Guha & Chattoraj (World Press, Calcutta).

3. The Industrial Economy of India by S. C. Kuchhal (Chaitanya)

4. Indian Economy : Its Nature and Problems by A. Ghosh (World Press, Calcutta).

5. Indian Industries by Sharma & Chauhan (Shivalal Agarwala, Agra) (Latest Edition).

6. Indian Industrial Economy by Prof. K. V. Sivayya & V. BM. Dass (Maruthi Book Depot, Guntoor-3.)

7. Industrial Economics by Sundaram.

(b) *References :*

1. Five Year Plans (Government of India)

2. *Yojana*, Planning Commission, New Delhi (*Journal*)

3. *Lok Udyog*, Bureau of Public Enterprises, New Delhi (*Journal*)

2. MANUFACTURING ANALYSIS AND WORKSTUDY

Objective : The purpose of this subject is to give the student a broad knowledge of the methods, processes and problems in running a manufacturing unit. With this purpose in view the subject should not be treated from a highly technical view but rather with the object of providing him with an understanding of the factors that determine the type of organisation and physical arrangements, as also methods of coordination and control. It is important to ensure that the instruction shall not be related to any one kind of factory products to the exclusion of others. The instruction should be covered in a course of 90 hours as indicated in syllabus, and accompanied by factory visits.

Syllabus :

General introduction to manufacturing analysis factors governing the choice of materials and processes ; (*a*) materials—basic properties of cast iron, mild steel alloy, tool steel, copper, aluminium, brass,

bronze ; (*b*) processes : forging, casting, metal working, metal removing processes—metal cutting, sawing and filing machines ; joining processes —lapping, honing and superfinishing. Continuous flow and assembly line manufacture (25 hours of instruction).

Determining objectives and policies of the manufacturing function —type of product, process, cost of plant and equipment in relation to number of workers. Automation, Manufacturing Economics, Economic size of the unit. Flexibility and expansion in organisation structure—plant location—layout —physical environment—materials handing—disposal of industrial effluents. Maintenance, Standardisation. Simplification, Diversification. Production, Planning and Control. Quality Control. S. Q. C.—Purchasing, Storekeeping and Inventory Control. (45 hours instruction).

Workstudy : Workstudy as a tool of job study, work standardisation and basis of financial incentive plans. Method Study : techniques used, design of the work place layout. Work measurement techniques used, stop watch time procedure, rating. Wage and salary administration. Incentive schemes (20 hours of instruction).

(*a*) *Suggested Readings :*

1. Manufacturing Processes—Materials and Production by S. E. Rusinoff (Times of India Press, 1965).

2. Principles of Industrial Management by Alford and Beatty (Ronald Press Co., N.Y.).

3. Introduction to Workstudy (I. L. O.)

4. Production, Forecasting, Planning and Control by E. H. Mac Niece (Wily 1961).

(*b*) *References :*

1. Manufacturing Processes and Materials for Engineers by Doyl, Morris and others (Prentice Hall, 1961).

2. Manufacturing Processes by J. V. Harding (Chattoo and Windus, 1961).

3. Manufacturing Process by Kahn.

4. Manufacturing Process by DeGarmo

5. Manufacturing Management by F. G. Moore (D . B. Taraporevala.)

6. Modern Production Management by E. B. Buffa (John Wiley)

7. Essentials of Industrial Management by Bethel, Atwater and Others (McGraw-Hill)

8. Factory Management and Business Organisation by A. S. Despande (Vora and Co., Bombay, 1966)

9. Effective Industrial Management by J. L. Lundy (Eurasia, New Delhi)

10. Workstudy in Administration by N. K. Panda (Allied Bombay)

3. MARKETING MANAGEMENT

Objective : To provide the student an insight into the distribution and marketing function and its relations to other activities in the organisation so as to enable them to analyse the problems frequently faced.

Syllabus :

The nature and scope of marketing. Role of marketing with special reference to emerging economics. Approaches to the study of marketing — Modern concept of marketing. Functions of marketing Relationship of marketing to other functional areas and general management in a company.

Sales Forecasting and market research—scope, objective and uses, Importance of consumers' point of view in marketing. Buying habits and motives of ultimate consumers. Economic factors - income levels, consumption patterns, population and other factors bearing on consumption. Marketing Research and its place in the organisation. Basic methods of collection, analysis, and assessment of marketing data and information. Determining sales forecasts and sales budgets.

Product planning and policies—New products management—requirement of new product success—development, testing and promotion. Policies for addition, diversification, and elimination of product lines. Importance of style and design, Branding and Product differentiation, Packaging.

Sales Planning—development and formulation of detailed sales plans—qualitative and quantitative objectives. Planning sales programmes and campaigns.

Channels of distribution. Factors in the choice of channel for consumer and durable products, Selling direct to the customer : mail order business, types of salesmen.

Marketing price policies. Major price considerations. Government and Price policies. Pricing practices.

Advertising and sales promotion—copy, media, measurement; advertising budget—public relations.

Exporting—essentials of overseas marketing—Identification of market potentials—Export procedure—Changing trends in India's foreign trade.

The Marketing mix—marketing of Industrial Products—Emerging Rural Markets in India.

Sales organisation and management : organisation of the marketing department. Selection of sales force and their training, supervision and remuneration.

Sales control ; control of marketing operations—Appraisal of sales performance. Marketing information for marketing decisions —Budgetary control and cost analysis for effective control of distribution.

(*a*) *Suggested Readings :*

1. Modern Marketing by H. Hepner (McGraw-Hill International, 1955).

2. Modern Marketing Management in the Indian Context by R. S. Davar (Progressive, Bombay, 1965).

3. An Introduction to Marketing by Smallbone, D. W. (Staples Press, London, 1968).

4. Sales Management by Canfield (Prentice Hall).

5. Basic Marketing by Cundiff & Still (Prentice Hall, India).

6. The Technique of Salesmanship by C. C. Knights (Pitman).

7. Business Budgets & Budgetary Controls by Willsmore (Pitman, 1960).

(*b*) *Reference* :

1. Marketing, An Introductory Analysis by Methews, Buzzels and others (McGraw-Hill, 1964).

2. Readings in Marketing by Dirkson, Kroger & Lockley (Irwin, 1963) Chaps. 5, 7, 8 and 13.

3. Market Research by Redmayne and Weeks.

4. CORPORATE STRUCTURE AND FINANCE

Objective : The purpose of this subject is to acquaint the student with the financial setting in which business enterprises operate, with important sources and forms of financing, and with the methods of financial analysis and decision making in use for handling financial needs and problems of firms.

Syllabus :

The Finance Functions in a business. Meaning, scope, classification and description of finance function. Promotion—company promotion in India, promotion and Companies Act, 1956—Recent trends in corporate promotion.

Capital needs—capitalisation, financial plan and cost of capital—over-capitalisation : under-capitalisation ; causes : effects. Comparison—watered stock, form of capital—changes in capitalisation. Working capital—Definition—Importance—Factors governing working capital — Sources of working capital.

Corporate securities ; ownership securities ; no-par stock ; ordinary shares ; preference shares—creditorship securities : debentures etc. Distribution of securities—Marketing of securities, underwriting with special reference to India.

Stock Exchanges—capital market—growth of capital market in India, Foreign Capital and Government policy—Joint ventures.

Regulation of Capital issues—Long term finance in India—Industrial Finance Corporation of India, State Finance Corporations, National Industrial Development Corporation, Industrial Development Bank of India, Industrial Credit and Investment Corporation of India.

Financial Decision-making—Banker's Appraisal of proposals for Advances, Term loans.

Capital formation—profits and Reserves : basis for measuring corporate income ; Profit and Loss account analysis, stable earnings—surplus and reserves—uses of surplus—Reserve and reserve funds.

Internal Financial Administration—self-financing in corporate Undertakings—importance—Reserve Bank of India Studies—Determination of internal savings.

Dividend policy—principles governing the dividend policy,—statutory limitations of dividends—stock dividend or Bonus shares.

State and Corporate Finance—objects of control—Administration of control—Examination and disposal of application—criticism.

Concentration of power—Indian Companies Act, 1956—Mahalanobis Committee ; Concentration in corporate sector—Monopolies Inquiry Commission : findings and recommendations.

Corporate Taxation—Computation of taxable income—Incidence of Corporate taxes.

Organisation of financial function in companies—controllers' responsibilities.

(a) *Suggested Readings :*

1. Corporation Finance by S. C. Kuchhal (Chaitanya, Allahabad)

2. Elements of Corporation Finance by Sharma and Chauhan (Shivalal Agarwala, Agra).

(b) *References :*

1. Corporation Finance by E. F. Donaldson (Ronald Press Co., N.Y.)

2. Modern Corporate Finance by Hutband and Dockeran.

3. Financial Statement Analysis : Principles and Techniques by J. M. Myer (Prentice Hall).

4. Financial Organisation Management of Business by Gerstenberg, C. W. (Asia, Bombay, 1960).

5. WRITTEN ANALYSIS OF CASES

Objective : The purpose of this Course is primarily to develop in the student analytical abilities and decision-making skills that aid in the performance of administrative function. The media of case

analysis, discussion, and report writing is largely used for this. Participation under the guidance of the staff, should enable the student to acquire, from this course, the following additional attributes in varying degrees :

(*a*) Capacity to identify and analyse administrative problems and situations and for interpreting data and using evidence ;

(*b*) ability to think logically and concisely ;

(*c*) skill in working together in groups and teams, effective oral communication of his own ideas and listening to the others' points of view ;

(*d*) capacity to conduct group meetings and obtain members' contributions for the resolution of the subject matter under consideration ;

(*e*) developing and evaluating alternative courses of action and arriving at sound decisions ;

(*f*) methodical presentation of written reports on case studies discussed ;

(*g*) some appreciation of the practical aspects of administrative practices.

Syllabus :

Cases for individual and group analysis will be prescribed by the Head of the Department in the beginning of each term. 60 cases, problem-solving exercises, role-playing situations, etc. will be assigned, covering issues from functional areas (production, marketing, finance, and personnel), business policy as well as process of management (planning, organising, motivating, and controlling) and human relations. 2 cases will be discussed per week in small groups of 12 to 14 students, devoting 2 hours for each case discussion. Students are expected to devote as much or more time outside the class in preparation of the case, and afterwards, writing reports. Staff guidance will be provided to improve the student's individual style of presentation of ideas. Stationary and format to be used will be uniform, and written analysis of cases will be maintained as a departmental record. Internal assessment of student's work will be based on this record, as well as on group participation.

No specific cases are prescribed. At least half the number of cases prescribed should be of Indian background.

The final examination by the University will consist of a Case and/or Caselets for individual analysis and discussion in a paper of three hours duration carrying 75 marks.

(*a*) *Suggested Sources of Cases :*

1.	ASCI Case Collection Series 1 and 2	Administrative Staff College of India, Hyderabad or Asia Publishing House, Bombay.
2.	National Bibliography of Cases	Administrative Staff College of India, Hyderabad.
3.	Case Problems in Business Management.	V. S. R. Murty (Asia Publishing House, Bombay).
4.	Cases for Administrative Action	William H. Newman, (Prentice Hall, 1963, Paperback).

(*b*) *References :*

1.	The Case Method of Teaching Human Relations and Administration	Kenneth R. Andrews, (Harvard University Press, 1965).
2.	The Case Method at the Harvard Business School	Malcoln P. McNair and Anita C. Hersum (McGraw-Hill Book Co. Inc., 1954).
3.	Group Thinking and Conference Leadership—Techniques of Discussion	William E. Utterback (Holt, Rinehart and Waiston, N.Y., 1961.

CHAPTER XLIX

DEGREE OF BACHELOR OF RURAL DEVELOPMENT SCIENCE

(B.Sc. Rural Development Science)

(THREE YEAR DEGREE EXAMINATION)

Regulations

Conditions for Admission

1. Candidates for admission to the Degree of Bachelor of Rural Development Science shall be required to have passed the Pre-University Examination of this University or of any other University as equivalent thereto *with any one* of the following combination of subjects :

(i) Mathematics, Physics and Chemistry

Or

(ii) Physics, Chemistry and Biology

Or

(iii) Mathematics, Economics and Sociology/Psychology/Logic.

and to have subsequently undergone a prescribed course of study in an affiliated college of this University for a period of not less than three academic years or nine terms.

Course of Study

2. The course of study shall comprise the following subjects according to syllabus to be prescribed from time to time :—

Part I—Language

The course is intended to enable the students to express scientific and technical ideas and produce small essays and dissertations on technical subjects through the regional language.

The study will extend over a period of one year and the candidate shall be examined at the end of the first year.

The candidates will be examined in one paper of three hours duration carrying a maximum of 100 marks (including internal assessment) at the end of the fitst year.

Part II—English

The candidates will be examined in one paper of three hours duration in Part II—English at the end of the first year of the course. The maximum marks prescribed for this paper is 100 marks (including internal assessment).

OBJECTIVES

(*a*) To assist the student in acquiring English as an effective means of communication of scientific knowledge.

(*b*) To assist the student to express his ideas based on scientific information clearly and precisely.

(*c*) To get the students familiarized with scientific terms employed in the teaching of the subjects relevant to the study of rural science and the rural development.

(*d*) To help the students acquire language skill in expressing their ideas with accuracy in speech and writing.

Part III

(A) Core subjects (compulsory for all candidates) :

(i) Economics of Development.

(ii) Modern Social Theory and Rural Social Institutions.

(iii) Social Psychology.

(iv) Civic Administration.

(v) General Science (1) and (2).

(B) Electives : ONE of the following groups will be taken.

(i) Agronomy and Horticulture.

(ii) Agricultural Entomology and Microbiology.

(iii) Agricultural Engineering.

(iv) Animal Husbandry and Dairying.

Or

(i) Economics of Small Scale and Rural Industrialization.

(ii) Rural Industrialization.

(iii) Industrial Management and Labour Welfare.

(iv) Social and Adult Education.

Or

(i) Community Development and Panchayat Raj.

(ii) Rural Health and Sanitation.

(iii) Social Welfare Administration.

(iv) Social and Adult Education.

Note : The Course will be on the pattern of the usual B.Sc. course with Theory and Practical work in the Laboratory or Field. A measure of internal assessment will be required where field work will have to be assessed when accomplished.

Scheme of Examination 4. The scheme of examination for the B.Sc. Rural Development Science shall be as follows :—

First Year—Scheme of Examination

S. No.	Subjects written exam. hours and marks	Internal Assessment (Test+Assignment+Practical)	Maximum marks
1.	Part I—Tamil : One Paper 3 hours 50 marks	50 marks	100
2.	Part II—English : One Paper 3 hours 50 marks	50 marks	100
3.	Part III— General Science : One Paper 3 hours Part A : Mathematics 50 marks Part B : Physics 50 marks	100 marks	200
4.	Civic Administration : One Paper 3 hours 50 marks	50 marks	100

Second Year—Scheme of Examination

S. No.	Subjects written exam. hours and marks	Internal Assessment (Test+Assignment+Practical)	Maximum marks
1.	Modern Social Theory and Rural Social Institutions : One Paper 3 hours 50 marks	50 marks	100
2.	Social Psychology : One Paper 3 hours 50 marks	50 marks	100
3.	General Science II : Part A : Biology Part B : Chemistry One Paper 3 hours 50 marks	50 marks	100
4.	Agricultural Entomology and Microbiology : One Paper 3 hours 50 marks	50 marks	100
5.	Field Work I : One Paper 8 hours — week 50 marks (Per Term)	50 marks	100

Third Year—Scheme of Examination

S. No.	Subjects written exam. hours and marks	Internal Assessment (Test+Assign-ment+Practical)	Maximum marks
1.	Economics of Development : One Paper 3 hours 50 marks	50 marks	100
2.	Agronomy and Horticulture : One Paper 3 hours 50 marks	50 marks	100
3.	Agriculture Engineering : One Paper 3 hours 50 marks	50 marks	100
4.	Animal Husbandry : and Dairying One Paper 3 hours 50 marks	50 marks	100
5.	Field Work II : One Paper 12 hours—week 50 marks (Per Term)	50 marks	100

5. No candidate shall be declared eligible for the Degree of Bachelor of Rural Development Science, unless he has completed the course of study prescribed and passed the examination in the several subjects contained in the course of study as detailed in the regulations.

Conditions of Eligibility of A Candidate for the Degree

6. A candidate shall not be declared eligible for the Degree of Bachelor of Rural Development Science unless he has passed the examination in the selected language under Part I, in English under Part II and in the optional subjects under Part III.

Marks for a Pass and Qualification of Successful Candidates

7. A candidate for the Degree of Bachelor of Rural Development Science shall be declared to have passed if he satisfies the following :

Part I—Tamil

Those who have obtained 35% of marks each in theory and Internal assessment separately.

Part II—English

Those who have obtained 35% of marks each in theory and Internal assessment separately.

Part III—Subjects

PASSING MINIMUM

First Year :

The candidate should obtain 35% of marks in theory (External) for the paper General Science I (Viz., Aggregate of Parts A and B put together). A separate minimum of 35% of marks in internal assessment should be obtained.

Second and Third Year :

The candidate shall be declared to have passed the examination if he/she secure not less than 35% of marks in each theory (External) paper. A separate minimum of 35% of marks in internal assessment should be obtained.

Field Work : (I and II)

The candidate shall be declared to have passed in field work if he/she obtains not less than 35% of marks in each year.

Classification of successful Candidates

8. Candidates who obtain 60 per cent or above of the total marks in any one of the parts I, II and III shall be placed in the first class in that part. Successful candidates who obtain less than 60 per cent but not less than 50 per cent of the marks in any of the parts I, II and III shall be placed in the Second Class. All other successful candidates in Parts I, II and III shall be placed in the third class.

Marks Statement

9. Statement of marks shall be furnished.

B.Sc. RURAL DEVELOPMENT SCIENCE

SYLLABUS

Part I—Tamil

The course is intended to enable the students to express scientific and technical ideas and produce small essays and dissertations on technical subjects through the regional language.

The study will extend over a period of one year and the candidate shall be examined at the end of the I year. Four hours of instruction per week will be alloted for the study of the language.

4 periods per week may be alloted to the teaching of Tamil for the first year which will be divided thus : ;

(1) for producing effective translation of scientific terms by the students ;

(2) for making the students to write articles in simple and precise Tamil ; and

(3) for making the students review scientific technical books and articles, (Prescribed as reference for intensive study) and that one period each will be alloted for divisions 1 and 2 and two periods will be alloted for division 3.

The following books for reference are recommended out of which the student has to choose two books for intensive study :

I. 1. நாமும் விஞ்ஞானிகளாவோம்

Or

2. விஞ்ஞான விளக்கம் Part I only—கலைக்கதிர் வெளியீடு

II. 1. கிராம இயக்கம்—ஜே. சி. குமரப்பா

Or

2. பஞ்சாயத்து ராஜ்யம் 'ட' எஸ். கே. டே.
பழனியப்பா பிரதர்ஸ்

Pattern of University Examination Paper :

There will be one paper of 3 hours duration :—

(*a*) Translation .. 20 Marks

(*b*) Two essays on prescribed books as reference for intensive study .. 20 Marks (10 each)

(*c*) General essay .. 10 Marks

Evaluation of Internal Assessment :

(*a*) Translation .. 20 Marks

(*b*) Two essays on prescribed books for intensive study .. 20 Marks

(*c*) General essay .. 10 Marks

The candidates shall obtain a minimum of 35% in each part of the Examination.

Part II—English

GENERAL ENGLISH AND COMPOSITION

SYLLABUS

1. The following syllabus is framed to provide a one-year course in English for the undergraduates joining the Rural Science course in B.Sc. with a scientific bent of mind.

2. OBJECTIVES :

(*a*) To assist the student in acquiring English as an effective means of communication of Scientific knowledge.

(*b*) To assist the student to express his ideas in basic scientific information clearly and precisely.

(*c*) To get the students familiarized with scientific terms employed in the teaching of the subjects relevant to the study of rural science and the rural development.

(*d*) To help the students acquire language skill in expressing their ideas with accuracy in speech and writing.

3. SYLLABUS IN DETAIL :

(a) Texts for detailed study :

(i) Scientific English Practice — by Thornley.

(ii) Living English Structure — by W. Stanard Allen— (For Remedial Exercises only).

(b) Extensive Readers :

The following books are recommended for Extensive reading.

			Published by
1.	Faraday, Maxwell and Kelvin	by D. K. C. Macdonald	A double day Ancnor original
2.	Pasteur and Modern Science	by Rene Dubos	,,
3.	How old is the Earth ?	by Patrick M. Hudley	,,
4.	Modern Business	by John Roscoe Turner	Alexander Hamilton
5.	The Web of Life	by John H. Storer-Jay N. Wing	Darling Foundation
6.	Supply and Demand	by Hubert Henderson	Economic Hand Books
7.	War of the Worlds	by H. G. Wells	
8.	Animal Farm	by George Orwell	
9.	Around the world in eight days	by Jules Verne	
10.	Journals :	(i) Science Today (ii) Eastern Economist.	

Students are expected to read atleast five of the books. Periodic assessment of their extensive reading should be made.

GRAMMAR AND COMPOSITION

(i) All the tenses with a special emphasis on simple present (both voices).

(ii) The following structural patterns which recur in scientific English.

There is..........

It is evident that........

Noun clauses e.g. He discovered that........

If clause........

As clause........

When clause and other clauses of this type.

(iii) The following verb patterns from Hornby's " The Advanced Learner's Dictionary of current English ".

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VP	1.	Vb X Direct object
VP	2.	Vb X not to X Infinitive
VP	3.	Vb X Noun or Pronoun X (not) to X Infinitive
VP	4.	Vb X Noun or Pronoun X to be X complement
VP	5.	Vb X Noun or Pronoun X Infinitive
VP	6.	Vb X Noun or Pronoun X present participle
VP	7.	Vb X Object X Adjective
VP	8.	Vb X Object X Noun
Vb	11.	Vb X that clause
Vb	13.	Vb X Conjunctive X clause
Vb	7.	Vb X Gerund etc.
Vb	25.	Vb X to X Infinitive.

(iv) NOTE-MAKING : Passages of about 300 words each from science writings should be given for this exercise. Practice will be given in composition classes. The students will be trained to take notes on lectures in subject classes.

(v) SUMMARY WRITING : The passages given for note-making will be summarised. Making summaries of certain passages from the Extensive Readers and science journals will be encouraged.

(vi) COMPREHENSION : Passages of scientific nature are to be given for this exercise.

(vii) MAP, GRAPH, TABLES READING : Students should be trained to extract information from maps, graphs etc.

(viii) TRANSLATION : A passage in the first language (Tamil) is given for translation into English. The passage may be rural-biased.

(ix) ESSAY WRITING : There will be a general essay question to be answered by students in about 450 words. Students will develop given hints into a well-kit essay. Topics will be of general scientific or rural interest.

TEACHING METHODS

GENERAL : The text book prescribed is only an instrument of teaching language skills. So greater emphasis will be laid on making the student learn by himself the usage and patterns. Oral practice in different sentence patterns will be a starting point in teaching any unit of grammar. Students will be encouraged to work in groups or in pairs.

EXTENSIVE READING : Introduction to the extensive readers will start with a lecture on fast reading. A general lecture covering some aspects of extensive readers may be done to stimulate interest in students. Students will produce evidence of their extensive reading in the form of short notes, diagrams and comments which should be valued for internal assessment. Periodical seminars and discussions will be conducted and students will present papers on the extensive readers they have read.

GRAMMAR : A sentence pattern may be introduced in the form of a substitution table with the help of which oral and written practice is given. Tenses will be taught first by the situational method. Short passages will be discussed in groups and closed or open questions will be framed and answered as and when a particular tense is taught. Verb patterns ought to be used along with the tenses. Recognition of tenses and verb patterns in the English text prescribed will be an additional practice.

NOTE-MAKING : The teaching of making notes starts with a demonstration, inviting points from the students and making them to arrange these points in an order. The next exercise will be group work. An interesting method of teaching and testing note-making will be requiring the students to make notes on a prepared lecture by a subject teacher and then scrutinizing their notes.

COMPOSITION : Lectures and debates on topics of scientific nature may be arranged and students will participate. The non-participants are expected to make notes on the lectures and debates. These notes will form the hints for constructing essays.

1. INTERNAL ASSESSMENT: In addition to the internal assessment tests, the performance of the students in composition classes will be taken into account in assessing the merits of the students. Students performance in class, seminars and debates will be considered for internal assessment.

Break up of marks for internal assessments :

(*a*)	Extensive Reading	20 Marks
(*b*)	Seminars and debates	10 Marks
(*c*)	Composition Note book	10 Marks
(*d*)	Overall performance (including oral English in classes) in tests and college examinations	10 Marks
	Total	50 Marks

University Examination :

Time : 3 hours
Maximum : 50 marks

(*a*)	Multiple choice questions and fill up the blanks questions (Grammar) ..	15 Marks	
(*b*)	Phrases and idioms and Summary ..	5 Marks	(Each $2\frac{1}{2}$)
(*c*)	Vocabulory (words to be chosen from " Scientific English Practice ") ..	5 Marks	
(*d*)	Note-making and Map reading ..	5 Marks	(Each $2\frac{1}{2}$)
(*e*)	Comprehension ..	5 Marks	
(*f*)	Translation ..	5 Marks	
(*g*)	Essay ..	10 Marks	
	Total ..	50 Marks	

Books for Reference :

1. Patterns and Usage by Hornby
2. English in Tables by F. G. French
3. A proficiency Course in English by F. V. Bywater
4. The English we use by R. A. Close

5. English as a second language by R. A. Close
6. Teaching Faster Reading by Fry
7. Reading Faster—a drill book by Fry
8. Preparatory General English course for college classes CIE, Hyderabad.
9. Syntactic Structures by Chomsky, N.
10. English Syntax by Paul Roberts
11. Transformational Grammar and the teacher of English by Thomas Owen
12. An introduction to modern Grammar—Geist R. J. (Macmillan language series)

(Syllabus)

THE COURSE PROGRAMME

Part III—A. CORE SUBJECTS :

(i) Economics of Development
(ii) Modern Social theory and Rural Social Institutions.
(iii) Social Psychology.
(iv) Civic Administration.
(v) General Science (i) and (ii)

B. ELECTIVES :

Either

(i) Agronomy and Horticulture.
(ii) Agricultural Entomology and Microbiology.
(iii) Agricultural Engineering.
(iv) Animal Husbandry and Dairying.

Or

(i) Economics of small scale and Rural Industries.
(ii) Rural Industrialization.
(iii) Industrial Management and Labour Welfare.
(iv) Industrial Engineering.

Or

(i) Community Development and Panchayati Raj.
(ii) Rural Health and Sanitation.
(iii) Social Welfare Administration.
(iv) Social and Adult Education.

ECONOMICS OF DEVELOPMENT

Part I

(*a*) Development of Economic life—Principal Stages, Economic Development on history.

(*b*) Trends in Economic thought on under development.

(*c*) Social and Economic indicators of growth—Factors that hinder and promote economic development in developing countries.

Part II

ECONOMICS OF RURAL DEVELOPMENTS

Enterprises : Agricultural—home industrial and Commercial—various professions : Services of the rural world.

— market organisation — Rural economic and social system is a complex and coherent whole.

— Improvements and reforms must be the object of an action marked by continuity.

Rural People : Agriculture—motif of production—Techniques of production Land—Standard of life—Rural poverty.

CONCEPT OF " GROWTH WITH JUSTICE "

Part III

(*a*) Development Planning :—Characteristics of Development plan—Development planning in parctice and its problems —Development Planning and its future Evaluation of Development Planning.

(*b*) Measuring of economic development—Concept of Dualistic Development—Theories of economic growth—Economic Planning—Current forms of economic planning in India and abroad—Regional Planning—Perspective Planning—Review of the Five Year Plans—Alternative paths to economic development—The role of government in development planning.

(c) Resources of Planning including Finance :

(i) Mobilising domestic Resources : Role of capital formation—Government as a saver, financial development inflation and its effects—Budgeting for Development.

(ii) Foreign Resources : Public financial aid, international liquidity and development, finance—Private foreign investment—Technical know-how and managerial skill transfer and productivity.

(iii) Rationable of allocating investment resources—Public expenditure policy.

(iv) Industrialisation and agriculture—labour absorption problems—use of technology and techniques of production.

(*d*) Human Resources Development : Population and poverty —policy for India—Population planning—Role of labour force in the economic growth—labour productivity—Role of education in the development process—Manpower ways and incentives—Entrepreneurship and economic growth.

(*e*) Trade and Development : Contributions of trade to development—Dynamic benefits of trade—Pattern of Internal trade Marketing—Pattern of International Trade among developing nations and external bottleneck—hindering development—Evolution of trade policy—Regional Integration and Development.

AGRICULTURAL ECONOMICS

Part IV

(*a*) Agricultural Planning in India's Five Year Plans. Land problems—Land Mass ratio—Land Reform measures and their implementation and evaluation—Productivity of lands—IADP Programme and dry forming technology.

(*b*) Farm Management : Mechanisation of agriculture and agriculture as business production—financial and marketing management—input output analysis.

(*c*) Factors of Production—Combination of Factors of Production —Law of variable proportion—Size of firm-cost, price and output.

(*d*) Agricultural Labour : Finance : Nature, Sources and problems—The various financial Institutions public and private. Marketing : Characteristics of Agricultural Marketing—concept of marketable surplus—financial institutional and commodity approach to marketing—latest developments in agricultural marketing—co-operative—relief selling.

INTERNAL ASSESSMENT

—Seminars

—Discussions

—Assignments on Farm management etc.

—Survey reports—field reports.

MODERN SOCIAL THEORY AND RURAL SOCIAL INSTITUTIONS

I. (*a*) Sociology and Rural Sociology : definitions, scope and methods.

(*b*) Current trends in social thought.

(*c*) Rural world : Characteristics of the rural world. Village, past and present, patterns of settlement, rural, urban differences, Land divisions, Land tenure and agricultural systems.

II. RURAL COMMUNITY : Concept of community under village conditions, characteristics of a rural community, nature of rural sub-groups, their characteristics and their interrelationships. Intra and Inter village relationships.

III. STRATIFICATION IN RURAL COMMUNITIES: Role, status, class and caste differences. Process of Sanskritization and Westernization, Concept of social mobility and applied to landbased agricultrual society.

IV. RURAL SOCIAL INSTITUTIONS : Marriage, Family, Caste and other factions.

Educational, political, economic, religious and other institutions.

V. RURAL LEADERSHIP :

Traditional and emerging patterns.

VI. RURAL SOCIAL PROBLEMS :

Indebtedness, unemployment, underemployment, rural health, levels of living, child marriage and status of women, Illiteracy and economic backwardness.

VII. RURAL SOCIAL CHANGE :

Factors bringing about changes in villages, transport, industrialization, impact of urbanization, social legislation and directed and planned social change, spread of education and cultural transmission through mass communications media.

VIII. A comparative study of regional rural life.

SOCIAL PSYCHOLOGY

1. (*a*) Elements of General Psychology with special reference to :

(i) Biological nature of man.

(ii) Nature-nurture interaction.

(iii) Principles of growth and development.

(iv) Behaviour as dynamic adjustment ;
Behaviour as a function of : S-(o)-R Paradign S-R.

Organism
Environment
Interaction.

(*b*) An understanding of :

(i) Perceptual processes.

(ii) Motivation and Emotion.

(iii) Learning.

(iv) Thinking and reasoning.

(v) Remembering and forgetting.

(vi) Personality.

(vii) Intelligence.

2. **Determinants of Social Behaviour :**

(*a*) Cognitive.

(*b*) Motivational and

(*c*) Aspects of personality.

3. (*a*) Formation, development and changes of attitudes.

(*b*) Attitude measurement.

(*c*) Nature of prejudice and stereotype.

4. **Culture and Society :**

(*a*) Norms, values, modes, customs, habits and folkways.

(*b*) Culture and personality.

(*c*) Communication processes, Language, Education and Propaganda.

(*d*) Public opinion and opinion change.

(*e*) Political behaviour.

5. **Group Dynamics :**

(*a*) Types of groups.

(*b*) Formation, growth and decay of groups.

(*c*) Leadership and following.

(*d*) Group effectiveness.

(*e*) Group pathology.

(*f*) Individual and the group.

CIVIC ADMINISTRATION

The state, origin, purpose and functions, classification of state and governments, organization of government, the executive, legislative and the judiciary. Local government, Constitution of India, salient features, Preamble, Directive principles of state policy, Fundamental rights, powers, functions, duties, responsibilities, financial resources of both Union and State Governments. Union-State relationship. The machinery of the Union government, the machinery of the State Government, the machinery of the local government, democratic decentralisation, administrative decentralisation, economic

decentralisation, political decentralisation, constitution and structure of local bodies, function, areas, authorities, the local executive, the permanent service, state control forms, agency degree, method of state control. Local finance, nature characteristics. Local finance in India, State-Local relationship, definition of civics, citizenship rights, duties, good and deficient. A comparative study of local self-government in India and U. S. A., Britain, France, Russia, Yugoslavia, Nepal. Problems of local self-government with special reference to India.

Books Recommended

1. Grammar of Politics	:	Kaski
2. Politics	:	Appadurai
3. Politics	:	Asirvatham
4. Constitutions of India	:	Publication Division
5. Federal Finance in India	:	R. N. Bargava
6. Political Theory	:	Gilchrist
7. Rajamanner Committee Report on Centre-State Relationship		
8. Theory and working of union Finance in India	:	S. N. Bargava
9. Development Finance	:	U. K. Hicks
10. Public Finance	:	A. C. Pigou
11. Modern Governments	:	Finer

Electives :

AGRONOMY AND HORTICULTURE

Part I—AGRONOMY

(i) Soils—rocks and minerals : Weathering and soils formation : Secondary and transported soils, sub-soils.

(ii) Typical soils and their properties, Soil moisture. Soil organisms, Important constituents necessary for plant growth. Soil reactions.

(iii) Mechanical analysis and textural classification of soils.

(iv) Kinds of soils, their chief characteristics.

(v) Tillage — its objects and principles of common tillage practices, such as ploughing, harrowing, levelling, inter cultivation etc.

(vi) Soil fertility and factors effecting it.

(vii) Conserving soil fertility—soil conservation, cauaes and types of soil erosion, extent of losses, methods of control. Central and State programme for soil conservation.

(viii) Maintaining soil fertility—Crop rotation, mixed cropping and tillage.

(ix) Increasing soil fertility, manures and manuring bulky and concentrated organic manures. Defects in methods of handling farm-yard manure and compost.

(x) Rural and Urban wastes. Rural compost and Urban compost, Inorganic fertilizer, single—complete and mixed. Judicious use of manures, fertilizers.

(xi) Soil moisture regulation. Principles and practices of irrigation and drainage.

(xii) Principles of dry farming practices.

(xiii) Weeds and their control by various methods.

(xiv) Land improvement, Reclamation and salted, acid, alkaline, waterlogged and wood-infested lands.

(xv) Classification of crops—field, forage and vegetable.

(xvi) Methods of crops improvement introduction, selection and hybridization.

(xvii) Seed testing and purity maintenance.

(xviii) Methods or propogation :
Study of important grain, pulse, oilseed, fodder, vegetable and miscellaneous.

Crops—such as wheat, paddy, jawar, bajra, maize, pulse, arhar, peas, gram.

Oilseeds—mustard, groundnut, linseed, castor, coconut.

Fodder—lucerne, guinear gram, napier grass, fibrescotton,

Vegetables—potato cole crops, cabbage, cauliflower, knukol, brinjal, tomatoes, and

Miscellaneous—sugarcane, tobbacco, spices, chillies, under following heads :

(*a*) Soil and climatic requirements.

(*b*) Seed-bed preparation.

(*c*) Important varieties.

(*d*) Seed selection and presowing treatment.

(*e*) Seed rate and methods of sowing.

(*f*) Manurial requirements.

(*g*) Irrigation.

(*h*) Interculture.

(*i*) Rogueing.

(*j*) Harvesting.

(*k*) Threshing.

(*l*) Winnowing.

(*m*) Storage.

(*n*) Economics (average cost of cultivation and return)

(*o*) Marketing.

Part II—HORTICULTURE

POMOLOGY

1. Role of fruits in human diet and their economic importance.

2. General information regarding fruits grown in different parts of India.

3. Selection of site for fruit growing.

4. Methods of propogation of fruit plants, viz., seed, layering, budding and grafting.

5. Methods of planning.

6. Pruning and training.

7. Special treatment for encouraging fruiting viz., bending, ringing, girdling, noticing and root pruning.

8. Grading, packing and marketing of fruits.

9. Production of important fruit crops (such as mango, citrus fruits, guava, bananas, papya, grapes and those growing in the locality) with detail of all operations from land preparation to harvesting and marketing of produce.

10. Rejuvenation of old orchards.

11. Preservation of fruits and vegetables by drying and making jam, jelly, syrups and squash.

ORNAMENTAL GARDENING

1. Planning floral garden for homes and school compounds.

2. Cultivation of important annuals, viz., edging plants, hedges, shrubs, climbers, and trees suitable for the locality.

3. Maintenance of decorative pot-plants.

ENTOMOLOGY AND MICROBIOLOGY

(1) ENTOMOLOGY

1. The position of insects in animal kingdom.

2. Economic importance of insects.

3. Morphology, anatomy, and development.

4. Physiology.

5. Ecology.

6. The classification of insects.

7. Insects pests of trees and scrubs.

8. Insect pests of crops.

9. Insect pests of agricultural commodities in storage.

10. Household pests.

11. Pests of farm animals and household stock.

12. Insect factors of plant virus disease.

13. Common insecticides.

14. Appliance for the application of insecticides.

15. Control of insects.

16. Useful insects.

(2) MICROBIOLOGY

1. The history of Microbiology.

2. Morphology, growth and reproduction of bacteria.

3. Nomenclature and classification of bacteria.

4. The Molds.

5. The Yeast.

6. The Virus.

7. The Rickettsial.

8. The Protozoa.

9. The Algae.

10. Micro-organism and diseases of man, animals and plants.

11. Microbiology of soil.

12. Microbiology of milk.

13. Microbiology of water.

14. Microbiology of air.

(3) AGRICULTURAL ENGINEERING

1. Importance of Agricultural Engineering.

2. Surveying.

3. Elementary surveying, Chain surveying, measurement of area of regular and irregular fields, division of fields, measurement of volume of manure pits, hay stocks and wells.

IRRIGATION AND DRAINAGE

IRRIGATION :

1. Source of irrigation—(i) rain ; (ii) canal ; (iii) tanks, isolated rainfed tanks, tanks in groups, tanks supplied from streams and rivers catchment and capacity of tanks ; (iv) wells—open tube, artesian, shallow and deep wells.

2. Types of irrigation, inundation, flow and lift.

3. Different types of water lifts, their discharge conditions under which they can be successful, and cost of working and installation. Knowledge of command area controlled sources of irrigation.

4. Duty of water, time and frequency of irrigation, and water requirement of crops.

5. Losses of water by evaporation, transpiration and seepage ; losses in tanks, canals and fields ; methods of conservation of soil moisture ; rational use of canal water and avoidance of water losses ; adverse effect of over-irrigation.

6. General idea of major, medium and minor irrigation projects, structure of water rates in India with special reference to the practice of the region in which the Institute is situated ; betterment levy.

DRAINAGE :

Phenomenon of water logging with specific examples ; necessity of drainage, types of drainage and methods of drainage with special reference to low lying areas.

(4) AGRICULTURAL IMPLEMENTS AND MACHINERY

1. Study of simple mechanical devices, viz., screw, lever, inclined planes etc.

2. Efficiency and draft and factors effecting it.

3. Prices, sources of availability, comparative working costs and draft required for various implements such as ploughs, harrows, cultivators, seed-drills, hoes, levellor, ridger, bund former, reaper, mover, chaff-cutter, cane crusher and thresher.

Purpose for which the following machinery and implements are used—water lifts, (suited to the locality) pumps, oil engines, electric motors, tractors and bulldozers.

(5) FARM STRUCTURES AND ROADS

FARM STRUCTURES :

1. Selection of site and different design suitable for the locality with estimated cost for structures, such as farm house, cattle shed, silo pits farm store room and water trough.

2. Fencing, pipes for water supply and drainage system, their cost and sources of availability of materials and methods of their installations.

ROADS :

1. Local roads, their importance, payment, kharanja and paranja types.

2. Preparing estimate of kharanja and paranja with cost per unit, such as, earth-work, filling, laying bricks, making drains and pointing.

3. Requirement and proximity of materials, such as brick and stone, cement and sand.

4. Estimate of the earth-work for kachha roads, process of laying earth in layers, ramming and allowance for settlement.

(6) ELECTRICITY ON THE FARM

Uses of electricity, electrical definitions and units, Selection of electrical motors, their working and maintenance.

ANIMAL HUSBANDRY AND DAIRYING

(A) ANIMAL MANAGEMENT AND HOUSING :

(i) Importance of livestock in relation to rural economy, animal husbandry and diversified agriculture.

(ii) Study of cattle breeds of all India importance, dairy type, draught type and duel type, exotic dairy breeds and their role in increasing milk production in India.

(iii) Care and management of different classes of livestock, how to approach and handle animals, restraining animals, identification of animals, tattooing and branding, rooming and washing animals, determining age of animals, dentition.

(iv) Housing of animals, general principles, construction of animal houses and airy plants, sanitation and methods of manure disposal.

(B) GENETICS AND ANIMAL BREEDING

(i) Heredity, cell structure and cell division, chromosomes and genes, chromosome number, determination of sex, principles of Mendal and Medelian ratios.

(ii) Systems of breeding, in breeding and cross breeding, hybridisation, grading, selection, methods and indices, index, culling livestock, reproductive physiology, Oestrus cycle, normal regulation of reproduction, sterility in animals, artificial insemination.

(C) DAIRY FARMING :

(i) Importance of milk in human diet, food value of milk, structure of udder, physiology and milk secretion.

(ii) Composition of milk and reasons for variations.

(iii) Clean milk production, sources of bacterial contamination, different types of bacteria in milk and changes they bring about in milk, milk and public health, diseases transmitted through milk, sterilization of utensils, dairy detergents.

(iv) Processing milk, Pasteurisation and homogenisation.

(v) By-products of milk, cream, butter, condensed milk, skimmed milk, milk powder, curd and toned milk.

(vi) Organisation of dairy farm, principles of dairying, land requirements, number of animals to be maintained, replacement of stock, management of dairy herds, age at first calving, lactation period, dry period, calving interval, peak yield, farm records.

(vii) Dairy cattle feeding, principles of animal nutrition, maintenance and production ratio, feeding standards, concentrates ruffage, balanced rations, importance of green fodder, silage, pasture.

(viii) Physical examination of milk, basic tests to assess the quality of milk, sampling of milk, specific gravity test, fat, acidity and total solids in milk, adulteration of milk, milk standards and S N F, Estimation of added water in milk.

(ix) Disease problems in cattle, basic knowledge of common ailments, contagious diseases and their control, preventing measures.

(D) POULTRY FARMING :

(i) Role of poultry, general and financial aspects of poultry farming, planning a poultry farm both as a side-line and à full-time commercial venture.

(ii) Breeds of poultry, pure lines, cross breeds and hybrids, structure of egg and formation of egg, reproductive organs in hen and sexing of chicks.

(iii) Systems of poultry keeping, open range, semi-intensive deep litter system and laying cages and batteries, equipment in poultry housing.

(iv) Incubation of eggs, brooding chickens, rearing young stock culling poultry, identification of layer and non-layer birds.

(v) Feeding, poultry principles, feeding systems, feeding methods, animal protein factor feed ingredients, greens in poultry feeds.

(vi) Marketing problems, fresh and stale eggs, infertile eggs, defertilization, preservation and storage of eggs, grading of eggs.

(vii) Diseases, problems in poultry, basic knowledge of common diseases, control of diseases, vaccination programme, deworming poultry, dipping and spraying for external parasites.

ECONOMICS OF SMALL SCALE AND RURAL INDUSTRIES

(*a*) Size of industry, location and other incidental factor, economic value of the industry in respect of industrial balance import, export pattern, fiscal strength and exploitation of unexplored natural resources, employment potential, production of needed goods and services in the growing economy, investment of capital, potentials of profit, their role in industrial growth.

(*b*) Capital requirements, fiscal capital, lands, buildings, equipment, furniture and fixture, working capital sources of capital.

(*c*) Raw materials and supplies, direct materials and supplies, bottlenecks in their supply and governmental issues and policies.

(*d*) Power, fuel, water, problems and prospects and transportation internal and external, problems of infra structure development.

(*e*) Man-power, labour, availability direct and indirect labour training facility, institutional services, public and private productivity output and techniques of production, (technology).

(*f*) Finance, source of finance, public and private, governmental policy, problems of adequacy of credit, profit utilisation as a source of finance.

(*g*) Marketing, product description, scales, chemicals aid methods including institutional agencies, Public and private, geographical export of market, domestic and export competition. Market research, problems of marketing, governmental issues policies in respect of marketing.

(*h*) Techniques of evaluation of rural and small scale industies and prospects of development.

RURAL INDUSTRIALISATION

1. Definition and history of cottage and small scale industries.

2. Importance of cottage and small scale industries in Indian economy.

3. Developmental agencies associated with the programmes of rural industreis like :—

   (a) All India Boards

   (b) Khadi and Village Industries Commission

   (c) National Small Industries Corporation

   (d) State Directorate of Industries and Commerce.

4. Financial assistance to the cottage and small scale industries.

   (a) Reserve Bank of India

   (b) State Bank of Indiax

   (c) Commercial Banks

   (d) State Finance Corporations

   (e) Industries Co-operative Banks.

5. Marketing problems of rural industries

6. Role of small industries service industries and Industrial extension Centres.

7. Programmes of Industrial Estates and Rural Industries Projects.

8. Structure and functions of industrial co-operatives.

9. Sources of finance of industrial co-operatives including Government.

10. Supervision, inspection and audit of industrial co-operatives.

11. Departmental and set up relating to industrial co-operatives.

12. Government assistance to industrial co-operatives.

13. Practical exercises in writing up account of industrial co-operatives ; cash book, ledgers, trial balance, balance sheet.

14. Role of Panchayati Raj Institutions in developing rural industries under Community Developmental Programme.

15. Rural industries development under Five Year Plans.

INDUSTRIAL MANAGEMENT AND LABOUR WELFARE I

1. Evolution of commerce and industry. Industrial Revolution in England.

   Industrial Evolution in India, Industrial India, Role of Management, Government and Labour.

2. Launching a new enterprise, Marketing Research, Forms of organisation, Scale of operations, Plant location, layout, buildings, equipment, Financial, planning, labour force, Managerial staff.

3. Industrial risk and forecasting.

4. Product research and development.

5. Production planning, Production control, Routing and Scheduling, Production control, materials control, quality control.

6. Sales administration, Advertising and sales promotion, Marketing.

7. Wage and salary administration policies, Planning, Time study, Job evaluation and merit rating.

8. Personnel management.

9. Employee training.

10. Principles of industrial relation.

11. Growth of small Scale Industries, scope and limitation.

MANAGEMENT II

1. Nature and scope of business organisation : Forms of business organisations.

2. Nature of management, Administration and management, Evolution and development of modern management theory. Scientific management, Human relations, Management as a behavioural science.

3. Functions of Management, Organisation Structure.

4. Communication, Decision making.

5. Control, Tools of control.

6. Budgets and budgeting control.

7. Management accounting.

8. Social aspects, Employer employee relations, Participative management, Government and business, Government in business.

9. Planning, Indian plans.

10. Office management.

11. Management, an international perspective.

Note : The Paper may be divided into two parts and dealt with separately.

Syllabus

MECHANICAL ENGINEERING

B.Sc. (RURAL DEVELOPMENT)

II & III YEAR CLASSES

1. MECHANICS OF SOLIDS :

(*a*) Definitions of Force, Inertia, Mass, Acceleration of Gravity, Energy, Work, etc., Newton's motion laws, Moment of Inertia.

(*b*) Scalar and Vector quantities, composition and Resolution, and equilibrium of forces, Couples and Moments.

(*c*) Kinematics, movement of inclined planes, Friction and theory of lubrication.

2. THERMODYNAMICS :

Co-efficient of expansion, Laws of Thermo dynamics, Ideal Gas Laws ; Ideal cycles with perfect gases ; Combustion of fuels.

3. STRENGTH OF MATERIALS :

Definition of stress, strain ; Young's Modulus, Elastic limit, Yield point ; Tensile strength ; Compression strength ; Impact strength ; Fatigue limit : Hardness.

Deflection of beams, Simple bending movement calculations.

4. SIMPLE MECHANISMS :

Linkage, Cams, Gears, Pulleys, Belt drives and springs, simple calculations.

5. BASIC ENGINES :

Diesel, Petrol, Steam Engine, Steam Turbines and Hydraulic Turbines.

6. WORKSHOP TECHNOLOGY :

Various machining methods and basic machines like Lathe (versatile machine), Capstan, Turrets, Autos, Drilling Machine, milling machines, Shaping machine.

7. INDUSTRIAL ENGINEERING :

Basic idea about time and motion studies, Plant layout and industrial safety.

PRACTICAL COURSE IN MECHANICAL ENGINEERING FOR B.Sc. (RURAL DEVELOPMENT) II & III YEAR CLASSES

II YEAR

(a) Carpentary Section : Planing, Chiselling, making joints.

(b) Fitting Section : Chipping, Filing and making joints.

Machine Shop :

(*a*) Lathes : Turning (Straight, step and taper) threading, drilling and tapping.

(*b*) Shaping machine—making a taper block.

COMMUNITY DEVELOPMENT AND PANCHAYATI RAJ

Indian constitution, its salient features, planned development begins, problems of rural Indian urgency to solve them. Rural communities, and development. The role of Community Development in national planning, development, and administration.

Historical retrospect, genesis and concept of community development Articles of faith, concept, definition, basic elements and principle of Community Development, Community Development in India and other countries, its growth and organisation. Objectives of Community Development, methods of Community Development :—

1. Community organisation and

2. Extension, principles and teaching of Extension.

Education Programmes, contents and its application, Organisation, national, State, district, block and village community Development and Panchayati Raj. Human factor in community development administration, importance of human material, planning from below, coordination, training programme, evaluation and research.

Achievements and weakness of community development programmes in India.

PANCHAYATI RAJ

Evolution of Panchayati Raj in India, the importance of local self government system in national planning and development. Rural local bodies (Panchayati Raj) Urban local bodies (Municipalities, Corporations) Theory, principles and practice of Panchayati Raj, Creation type or form, granting of powers, powers of concept. Structure, organisation, interstructural relationship, area, functions, finance, scope, important elements, purpose, philosophy, objectives and patterns of Panchayati Raj, the three tier structure, village panchayat, panchayat samiti and zilla parishad, powers, functions and financial resources, the role of functional communities, staffing pattern. The need for a separate Panchayati Raj Service. Role of Officials and non-Officials, forms of control, agency, degree, method of state control over Panchayati Raj bodies, Problems of Panchayati Raj, finance, coordination,

official, non-official relationship, generalist, specialist relations, state Panchayati Raj, financial and functional relationship, allocation of powers, functions and financial resources, people's participation controversial issues, political parties, association of legislators, association of officials, the remuneration to non-officials, etc. A critical analysis of Panchayati Raj system in India.

RURAL HEALTH AND SANITATION

A. MICROBIOLOGY IN RELATION TO HEALTH

I. General introduction to Microbiology, Microorganism, their kinds and their role in the welfare of human beings.

II. Part played by Microorganisms in :

(*a*) Disease, causation,

(*b*) Effecting decomposition and

(*c*) Usefulness in industries.

III. Immunity, their types :

Vaccines, their compositions and the Immunisation Schedule for children under 5 years.

IV. Microscopes, their kinds and uses.

V. Principles and methods of Sterilization, Disinfection, etc.

VI. Methods of transmission of various disease causing organisms and their control.

B. POPULATION VS. HEALTH AND SANITATION

Introduction to Demography, Population problems. Population composition and distribution (Age, Rural Urban occupation, Literacy, Data for developing countries with special reference to India) Factors influencing fertility, Biological demographic and socio, economic, Population theories, Malthus, Marx, need for limitation of population, Population policy of India.

C. ENTOMOLOGY IN RELATION TO HEALTH

In insects, general character, their role in the transmission of human diseases, Public Health importance.

DIFFERENT INSECTS :

		Life Cycle	Diseases transmitted and Control.
(*a*)	Mosquitoes		
(*b*)	House flies	,,	,,
(*c*)	Sand flies	,,	,,
(*d*)	Flies	,,	,,
(*e*)	Lice	,,	,,
(*f*)	Ticks	,,	,,
(*g*)	Mites	,,	,,
(*h*)	Cyclops	,,	,,

PARASITOLOGY IN RELATION TO HEALTH

Parasites, intentional, causation of human diseases, Environmental sanitation and its relation to health.

I. Methods for disposal of excreta, Sewage and community wastes.

1. The public health aspects of excreta, Disposal.

2. What is a latrine and the requirements of sanitary latrine.

3. Public and household latrines.

4. Types of latrines.

5. Plan to implement a latrine, promotion programme.

II. Water supplies to ensure that they are pure and wholesome.

1. Water and health, Role of water in the functioning of the human body.

2. Different types of sources :
   Rain and snow, ground water, surface water, occurrence, characteristics etc.

   Quantity and quality of water supplied.

Aspects of protected water supply schemes.

3. Diseases transmitted through water :

Bacterial, Helmintha, Viruses etc.

4. Disinfection of water supplies : Sterilisation, Disinfection and chlorination, definition, types of domestic disinfection, Boiling with chemicals, Potassium Permanganate, Ultra violet rays. Chlorination with Chlorine compounds (Bleaching Powder) Dosage, Mechanism etc.

III. HOUSING :

1. The relationship of housing to health and problems of housing. Economic and sociological factors. Overcrowding in households. Incidence of Pneumonia and TB with increase in overcrowding, Shortage of accommodation resulting in overcrowding. Slum or substandard houses. Rural houses suffer from faulty design absence of any sanitary installation and needless exposure to dust, smoke, virmin etc.

2. Requirements of healthful housings. Physiological, psychological needs, Protection from contagious diseases Prevention of accidents.

3. Basic principles of healthful housing.

   1. Environmental hygiene committee reports.

   2. Madras Provincial Housing Committee, Minimum living space, their area of living room, doors, windows and ventilators, kitchen, bathroom, verandah and other amenities to be provided for each house.

   3. The Railway Board Committee.

   4. Scheme for housing provided in the National Plans.

IV. VENTILATION AND LIGHTING :

Purpose and types of ventilation. Natural ventilation, windows and ventilators, area, School and laboratory required, living rooms, Industries etc. Artificial ventilation, Exhausted fans, prim systems Air-conditioning, Measurements of temperature, humidity and air velocity.

LIGHTING :

Measurements used in lighting. Standards for lighting for different types of work. Methods to provide lighting. Power lighting contributes to defective vision. Increasing in accidents, decreasing efficiency, candle power, foot candle, day light factor, Reflection etc. Different colour etc.

V. D & G TRADES :

Restaurant, Eating places, Hotel etc. Inspection, evaluation, suggestions for improvements Licensing under Food adulteration and D. & G. Trades Act.

VI. FOOD :

Milk sanitation, Public health aspects or food sanitation. Food borne diseases etc.

VII. INSPECTION OF MARKETS :

Vegetables and Mutton markets. Disposal of solid and liquid wastes from vegetable and mutton markets.

VIII. BAKERY AND AERATED WATER FACTORY,

INSPECTION :

Sanitary condition and maintenance.

IX. SCHOOL SANITATION :

As part of a school health programme. School sanitation programme. Standards prescribed to various components of school health programme. The provision of supplementary food to improve the nutritional status of the child. Physical culture through games, sports and exercises and recreational activities. Health Education. physical arrangements, Building, Classroom.

CLASSROOM ARRANGEMENTS :

Furniture, black-board, ventilation, lightings, flooring etc., Teacher-Pupil ratio, Minimum size of a classroom. Sanitary provision, water supply, latrines, urinals etc. and disposal methods of wastes etc.

INDUSTRIAL SANITATION :

Public Health Aspects of Industrial hygiene. Scope of Industrial Hygiene service occupational hazards arising out of industrial operations. Prevention of industrial hazards. Disposal of industrial work.

SOCIAL WELFARE ADMINISTRATION

The importance of social planning to achieve rapid economic growth and social justice. The need for a social policy, social policy resolution in the Directive principles of State policy of the Indian constitution, Trends in social welfare administration. Planning of social services, social welfare services and social security measures, policy and programme planning, principles, objectives, contents of social policy, social welfare and social security services in the five year plans. Inter relationship between social administration and public administration, similarities, differences, scope, impotance and principles of social welfare administration. Role of social legislations in social welfare administration, levels of social welfare administration, central, state, district, and block. Relative roles of state and voluntary organisation in social welfare administration. The human factors in social welfare administration. Social services, welfare and social security programmes in India. Personnel recruitment training and conditions of services, supervision, nature of supervision. Changing concept of supervision, staff development. Relationship between non-officials and officials and generalist and specialist relations in social welfare administration with the existing public administrative machinery, allocation of functions and responsibilities, coordination, finance, methods and procedure, personnel and training, response of voluntary organisations, administrative limitation etc. Research, evaluation.

ADULT AND SOCIAL EDUCATION

I. The concept of Adult Education in relation to Mass Education, Social Education, Fundamental Education, Functional Education, Formal Education, Continuation and National Education.

II. Adult and Social Education movements in U.K., U.S.A., Russia, Denmarfl and Sweden and Japan as compared with India.

III. Aspects of Social and adult education for workers :—

Home life, civic life, Health and Sanitation, wholesome recreation, citizenship and democracy, Social responsibility, National integration, Promotion of group action and Community development, economic growth and public welfare, problems of socially and economically disadvantaged.

IV. Methods of literacy, syllabus and books for literacy and for neoliterates. Individual and group methods, Use of audio-visual aids and communication techniques, discussions, seminars, symposia, panel discussion and small group conferences.

V. Programme of Adult and Social Education as formulated by the five year plans.

Organising adult literacy classes, Problems and methods. Developing adult and social education programmes through panchayats and other agencies.

Co-operatives, schools, youth clubs, libraries, Mahlir Manrams and other voluntary organisations.

Organisation of cultural and recreational programmes, film shows, forums, exhibitions, baby shows, cattle shows, Melas, Plan weeks, literacy campaigns and other programmes during National and other festival days.

VI. (*a*) Training of workers for adult and Social education work ; content, methods and organisation.

(*b*) Indian and international organisations and Associations furthering adult and social education work and their programmes.

(*c*) Evaluation of adult and social education work, methods and procedures.

DETAILED SYLLABUS FOR GENERAL SCIENCE

GENERAL SCIENCE PAPER I :

(Mathematics and Physics)

(To be offered as 4 hours per week (Theory) + 3 hours (Lab.) during first year of the course.)

GENERAL SCIENCE—I

Part A—MATHEMATICS

Basic rules of algebra—combining fractions—rules of exponentiations.

Common logarithms and Neperian logarithm—computation with logarithms.

Polynomiles—Remainder Theorem—Synthetic division—nots-solutions of quadratic equations.

Co-ordinate systems—distance between two points graphing—solutions by graphing.

Trigonometric ratios—values for special angles—elementary trigonometric identities.

Forming frequency distribution drawing diagrams and curves representing statistical data-interpolation.

Part B—PHYSICS

Time and its measure—stroboscope method—vernier calipers and Screw gauge Functions—Mathematical relations—Inverse square relation.

Motion along a straight line path—displacement—velocity—accelaration equations or motion.

Newton's laws of motion—inertial and gravitational ass-free fall—circular motion—simple Harmonic motion—expression for period.

Planetary systems—Kepler's and Newton's contributions—Universal gravitation.

Momentum and its conservation—Work—kinetic and potential energy—Application of momentum and energy consideration for direct impact problem Laws of impact—coefficient of restitution

Molecular concept of gas—Boyle's and Charle's laws—Avogadro's law Absolute temperature—Kinetic Theory—expression for pressure—Derivation of gas Laws—Avogadro's Law—Temperature and internal energy—RMS velocity.

Reflection—Laws (Statement only)—images—rotation of plane mirror—Spherical mirrors—Law of distances (Statement only) focal length—Refraction Laws.

Prism-Derivation $M \frac{\text{Sin} \frac{A + D}{2}}{\text{Sin } A/2}$ — Lenses—focal length of convex lens—conjugate focal.

Velocity of waves—conditions—Young's experiment—Diffraction Rectangular apertuire—Theory of plane transmission grating—resolution.

Charging by friction-in-insulators and conduction—induction Coulmbe's Law electric charge and electric field—motion of charges in electric fields, electric potential.

Magnets—Magnetic field—H-Mapping the magnetic field—Neutral point. (Qualitative discussion only) Magnetic field near a long straight wire.

Electro Magnetic induction—induced EME and its direction—Faraday's and Lenz's laws—Induction coil.

Structure of the atom—electrons—protns and neutrans—Bohr's atom model—energy levels of H Atom—Hydrogen spectra. Photo electric effect—photon and its momentum—Debrogiie's concept of matter waves—expression for.

The laboratory course will consist of a total of 10 experiments as explained below :

1. Mapping of magnetic field due to —magnet—M.
2. Spectrometer—M of Prism.
3. Spectrometer—Grating—Mercury lamp.
4. Newton's Rings.
5. Potentiometer—Comparison of EMFS of cells and internal Resistance of a cell.
6. Wheatstones Bridge.
7. E. C. E. of Copper.
8. Calibration or Ammeter
9. Calibration of Voltmeter
10. Use of a Microscope.

EXPERIMENTS 11 to 20 :

These 10 experiments will be based on the following :

(i) Suggestions given in the laboratory guide in each of the 4 parts of the prescribed book for the theory course (viz. Physics PSSC, Reprinted by NCERT, Parts I to IV, Revised Fourth Indian Edition, 1970).

(ii) Experiments based on Physics teaching kits, such as Dynam kits, Bangalore.

The instructors would choose 10 experiments from the above (i) and (ii) and offer them as experiments **11** to **20**. These should be on topics not covered under the experiments 1 to **10**.

EXAMINATION :

General Science will consist of two parts :

Part A—Mathematics

Part B—Physics

Under **Part B 3 questions** to be answered out of five Max. **50** marks. Problems involving only the direct application of the theory may be asked.

PRACTICAL EXAMINATION :

Duration 3 hours. Max. **100** marks on internal assessment one experiment may be asked.

GENERAL SCIENCE—Paper II

BIOLOGY

(Syllabus)

I. Introduction—Biology—what is it about ? Knowledge about life, importance for the society in terms of agriculture, control of disease etc.

II. Basic structure and function of living cells. The structure and function of all the sub-cellular system. Cell energetics—Respiration and Photosynthesis.

III. Division of cells—Mitosis and Meiosis.

IV. Reproduction of flowering plants and animals ; Parts of a flower ; Pollination—fertilization—seed structure and germination (Bean only).

Frog :—Reproductive systems of male and female fertilization on — embryo and life cycle.

Bacteria and Virus.

V. Hereditary materials—Chromosome—D.N.A. and R.N.A. Genetic code.

VI. Forest—Ecology of forests—Importance of forest—Conservation of wild life.

VII. Sea Ecology of sea Economic importance of sea.

VIII. The study of the following families with special reference to their economic importance—preparation of artificial key to identify these families.

1. Malvaceae 2. Cruciferae 3. Papilionaceae 4. Umbelliferae 5. Cucurbitacee 6. Solanaceae 7. Palmae 8. Graminae.

IX. Plant diseases—Fungal, Bacterial and viral diseases—general symptoms—control.

X. Economically important animals.

i. Honey Bee—Bee keeping, ii. Lac Insects.

XI. Harmful animals. i. Mosquito—Malaria ii. House fly —Cholera iii. Rat.

PRACTICAL :

1. Animal cell and Plant cell.
2. Mitosis and Mosis.
3. Parts of a plant and a flower.
4. Structure and germination of Bean Seed.
5. External parts of a Frog Digestive and reproductive systems Dissection.
6. Preparation of artificial key to identify the families prescribed.
7. Plant diseases—Albugu, citrus Canker and Tobacco Mosaic Virus.
8. Examination of mouth parts of :

   1. Honey Bee 2. House fly 3. Mosquito.

GENERAL CHEMISTRY

1. *Water :*

Purification for industrial, domestic and laboratory use, industrial Effluents and their treatment—sewage disposal irrigation.

2. *Fertilisers :*

Inorganic and organic type—their manufacture and application—Evaluating the quality of Fertilisers.

3. *Insecticides and Pesticides :*

Their Chemistry and applications.

4. *Soap :*

Different types—manufacture—synthetic detergents.

5. ***Fermentation*** *:*

Manufacture of ethyl alcohol and methyl alcohol—various types of ethyl alcohol.

6. *Polymers :*

Polymer's action and synthetic polymers—Terelyne—Nylon—Polyvinyl chloride—Poly ethylene.

7. Industrial lubricants.
8. Hydrogenation of oils.
9. Chlorine—manufacture and industrial applications—Bleaching powder.
10. Hydrogen feroxide.
11. Cement—various type—manufacture and testing the quality of cement.
12. Chemistry of Mono, di and poly saccharides.
13. Production of steel—various types of steel and applications.

PRACTICALS :

1. Volumetric estimation of hardness of water.
2. Determination of total dissolved salts in water.

3. Estimation of acid value of butter and ghee.

4. Estimation of Fat in milk.

5. Determination of water content in adulterated milk.

6. Estimation of Nitrogen in urea, oil cake and Farm manure—by Kjal dahl method.

7. Determination of Ammonia—coil Nitrogen in Sulphate of Ammonia.

8. Estimation of total Phosphorus Pentoxide in Super Phosphate.

REFERENCE BOOK :

1. Modern Chemistry by Cearles E. Dull and others. Published by Holt, Rinchark and Winston inc.—New York.

2. A Text book of Inorganic Chemistry by J. R. Partington.

3. Organic Chemistry—Louis F. Fieser, Mary Fisser.

4. Laboratory Manual for Agricultural Chemistry—A. Sankaran